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**HEALTH MANPOWER PLANNING:**

**THE PERU CASE STUDY**

by

**Thomas L. Hall, M.D.**

**Division of International Health  
The Johns Hopkins University  
School of Hygiene and Public Health**

**Baltimore, Maryland**

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## ABSTRACT

A number of countries have undertaken to study their health manpower requirements in recent years, though unfortunately those with the most pressing needs have been least able to apply existing methodologies. To help correct this situation, the Agency for International Development contracted with The Johns Hopkins School of Hygiene and Public Health to do manpower studies in collaboration with several less developed nations, and, based on this experience, to suggest improved techniques for the measurement of manpower supply and demand. This monograph presents the methodology used, and findings resulting from the Peruvian health manpower study of 1963-64.

The Introduction describes Peru, its geographical, social and economic characteristics, and relates these to the health conditions, institutions and priorities.

Part I, consisting of seven chapters, is concerned with the supply of health manpower. Current supply was measured by means of a special census completed in 1964. The principal unexpected finding was a high rate of attrition of dentists, pharmacists, midwives, and to a lesser extent, physicians, from active practice. This was particularly evident among young graduates and is presumably due to a recent overexpansion in supply. Also documented was the marked urban concentration of health professionals.

Supply projections of the principal categories of health professionals were made to 1974 and 1984. Increments to supply were based on current

tendencies in the output of graduates and losses estimated according to alternative rates of attrition. The findings of a survey of the training institutions were used to estimate the costs of professional education, and to identify actual or potential educational problems.

Part II, on demand, begins with Chapter 8, which discusses alternative methodological approaches to estimating demand and describes the one used in the Peru study.

Chapter 9, on current demand, characterizes the health sector in 1964 -- the amount of services produced, the way they were distributed, and the resources utilized. The major findings included the following: nationally, Peruvians averaged about 1.4 doctor visits in 1964 though there was over a tenfold difference in the utilization rate in Lima and in communities of less than 10,000 population; both outpatient and inpatient services were characterized by low productivity compared with modern standards; health and health-related expenditures amounted to about 4.2 percent of the gross national product, with about two-thirds of this amount coming from public funds; Peru's health manpower profile showed a marked imbalance between the number of doctoral level health personnel on the one hand, and the number of allied professional, technical and auxiliary personnel on the other; slightly over half of the manpower occupied in the health sector were administrative and service personnel, this resulting in a high administrative overhead; comparison of the 1964 staffing patterns in the several hospital systems with standards developed for public sector hospitals in 1984 revealed a marked concentration of resources in the insurance funds and the armed and police forces' health services.

Chapter 10 gives the objectives, standards and constraints used to

Chapter 10 gives the objectives, standards and constraints used to estimate the demand for health manpower in 1984. The demand model postulates the following: large gains in ambulatory medical care and public health services and lesser gains in dental and hospital services; major increases in resource productivity; improved staffing ratios in public sector facilities; and approximate maintenance of the 1964 balance between the public and private sector demands for manpower. The manpower and fiscal costs of the demand model are estimated and an alternative demand projection is considered.

Part III, consisting of two chapters, discusses the implications of the supply and demand estimates on future manpower policy. Chapter 11 confronts the demand with the supply projections and suggests what measures are necessary to bring them into balance. The need for certain qualitative changes in the training programs is also discussed.

Chapter 12 concludes the monograph by examining four issues now facing Peru's health manpower planners -- health care organization, health care distribution, the organization of the manpower planning function, and needed planning research.

## PREFACE

### Why Analyze Health Manpower?

"Manpower planning means the total process by which proper development and wise utilization of the human resources of a nation is achieved in attaining the objective to which the nation has committed itself . . . It involves the use of existing or the development of new institutions to produce the manpower required, at the right time, in the right quantity, and of the right quality. It requires careful integration of the various institutions so that in the total of their functions they produce the people with the skills and knowledge necessary to the nation's economic, technological, intellectual and spiritual growth."<sup>1</sup>

Trained manpower has long been recognized as the health sector's most essential resource. Only in recent years, however, has manpower planning been given an importance comparable to facility planning. Despite this upsurge of interest in manpower, the development of health services continues to be retarded in many countries due to the failure to coordinate training programs with service requirements.

The resulting fragmentation of efforts has usually been ignored in the past. As long as health technology remained at a primitive level, the social costs of inefficiency were not readily apparent. But the importance of trained manpower to the operation of health

programs can no longer be neglected; even the uneducated farmer can see the new regional hospital, built to serve his needs, unopened for lack of personnel. Public health and hospital administrators realize the great impact they could make in solving community health problems if sufficient qualified health workers were available. As a result more and more countries have come to accept that the proper development of human resources requires national study and national planning.

Manpower planning has not proved easy. The factors which determine future demand are poorly understood, even in countries with abundant data and advanced technologies. However, in countries with a relatively favorable supply of manpower and a large private sector, poor manpower planning need not seriously affect levels of health.

Developing countries have no such margin of error. Resources in all sectors are scarce and alternative investments must be considered carefully in order to maximize returns. Yet it is in the developing countries where the mistakes made in manpower planning by countries in a more favorable state of development are most faithfully reproduced. Manpower-population ratios that developed spontaneously (i.e., without any conscious attempt to make manpower supply match demand) are often adopted in lieu of a more satisfactory method for anticipating requirements.

Other problems have retarded the development of manpower planning. One of the most pervasive has been the lack of an effective mechanism in many countries for coordinating the activities of training and

service institutions. The problem of how to attain a given manpower target has only begun to be faced.

As attempts to plan manpower resources have foundered on these complex technical and administrative problems, the need to devise improved methods of analysis, particularly for use in developing countries, has become obvious. Conscious of this need, the Agency for International Development awarded a grant in 1961 to the Division of International Health of The Johns Hopkins University School of Hygiene to study the manpower requirements in countries at differing stages of economic and social development. Shortly after the contract was signed, representatives of Johns Hopkins visited parts of Latin America, Africa, the Middle East and Asia to seek out countries with both an interest in, and research capabilities for, cooperating on such a project. As a result of this search collaborative agreements for manpower studies were concluded in Peru, Turkey, Taiwan, and Nigeria.

#### The Peru Study: An Overview

In July of 1962 a Johns Hopkins team consisting of Dr. Tom E. Davis, economist from Cornell University, Dr. Schuyler Fonaroff, anthropologist of the staff of the Division of International Health, and Dr. Paul Wehrle, public health physician and Professor of Pediatrics at the University of California School of Medicine (Los Angeles) arrived in Lima to begin field work on the Peru study. Counterpart personnel, designated by the Ministry of Public Health and Social Assistance (hereafter referred to as the Ministry of Health) of the Government of Peru were Dr. Armando Petrozzi,

Dr. Alejandro Sotelo, and Dr. David Tejada. Shortly thereafter political disturbances, leading to a break in diplomatic relations between the United States and Peru, forced suspension in the work on the study and the American team returned home.

With the political situation stabilized and the government returned to civilian control, the manpower study was resumed in July 1963. The full-time Hopkins representative was Dr. Thomas L. Hall of the staff of the Division of International Health. Dr. David Tejada, Chief of the newly created Health Sector Planning Office, designated sanitary engineer Jorge Salinas and Dr. Enrique Rubin de Celis, as the Peruvian members of the manpower study team.

Field work on the health manpower study lasted 13 months, from July 1963 to August 1964. Besides the two principal collaborators in the project, Mr. Marcial Aranguri, Planning Office statistician, contributed approximately six months to the study, other professionals of the Planning Office staff collectively contributed about six person-months, and the entire Planning Office was involved in the review of study design and progress on numerous occasions throughout the field work phase. The Planning Office and the Ministry of Health additionally contributed secretarial, auxiliary, and data processing personnel equivalent to about eight person-years.

The Peru manpower project encompasses a number of substudies designed to describe and project manpower supply and demand. Although later chapters will describe these studies and their results in detail,

it is useful to briefly summarize here the approach to analysis used.

Planning is most necessary where resources are in shortest supply. Concerning health manpower this means that attention will be inevitably focused on the health professions, where the cost of training is greatest and the consequences of inappropriate decisions most serious. In the Peru study these include the professions of medicine, dentistry, pharmacy, nursing, and midwifery.

The efficiency and effectiveness with which these professions can discharge their responsibilities depend in large part on the availability of an adequate supply of technical and auxiliary personnel. Categories of health workers of this type for which supply and demand projections were made include laboratory and x-ray technicians, auxiliary nursing personnel and subprofessional sanitary personnel.

The time and resources available for the Peru study did not permit the entire sector's manpower requirements to be included. Priorities had to be selected and, as a result, certain small but important categories of health workers such as sanitary engineers, social workers, dieticians, and health educators were only briefly considered. Two large categories, comprising administrative and service personnel, were included only in the cost projections.

The time scale used in planning varies widely depending on such diverse considerations as what is being planned, the predictability of the future, the duration of the budget, and the years in office remaining to a government administration. In most situations, program planning is short-term, i.e., less than five years. Events, needs, and policies may change with great rapidity.

Manpower planning requires a much longer period, for most of the health professions supply is essentially inelastic over at least a four- or five-year period and often for much longer. For a profession, such as medicine, even a ten-year planning period is insufficient. Decisions made in Year One can begin to affect supply only by Year Eight or Nine. Furthermore, by using a ten-year period the planner risks either over- or under-responding to an imbalance in supply and demand observed in the base year of the planning period. In the first case, efforts to correct a serious shortage of one type of personnel may result in such an expansion of output of the training institutions that the supply of health workers goes beyond meeting the original deficit and results in a surplus that can't be absorbed by the sector. Alternatively, if population growth and changing patterns of manpower utilization are not taken into consideration, corrections in supply may prove adequate to meet current deficits but not future needs. To minimize these dangers, supply and demand projections are made for a twenty-year period. Since the base line studies were completed in 1964, the projection year is 1984, with an intermediate projection to 1974.

The supply of health manpower at some future point in time is made up of three components: the supply at the starting point, plus increments to supply during the intervening period, minus losses. In this study the supply of each type of health worker was determined in a special census conducted in 1963-64. Future increments are projected assuming continuation of the present tendencies in the output of each type of health worker during the planning period. Alternative losses

rates are used based on conservative and optimistic assumptions as to the percentage of health workers remaining professionally active over time.

Demand projections are based on alternative hypotheses of how health services may develop during the planning period. Attention is focused primarily on the rationalization of manpower distribution and utilization within the public sector so that maximum productivity is attained. Each alternative formulates targets for the volume and mix of services to be delivered in 1984. Supply and demand projections are then compared and the implications for manpower policy examined.

A study of the scope undertaken in Peru is, of necessity, dependent on the collaboration of numerous persons and institutions. For this collaboration, given in generous measure, I am deeply indebted.

Regrettably, space allows individual acknowledgement of only a few. Heading such a list are the Ministers of Public Health and Social Assistance, Javier Arias Stella and Daniel Becerra de la Flor, and the Director General of Health, Carlos Quiros Salinas, under whose authority the manpower study was carried out.

More directly concerned with the many demands of the study were the deans of Peru's various professional faculties, Mario Leon Ugarte, Director of the School of Public Health, and Luis Angel Ugarte, Study Coordinator at the San Marcos Faculty of Medicine. Their continued interest and assistance is gratefully acknowledged.

I especially wish to note the vital contribution of the entire staff of the Health Sector Planning Office. Deserving individual mention for

their participation are David A. Tejada de Rivero and Alejandro Sotelo, B., past and present chiefs of the Planning Office, Marcial Aranguri L., now chief of the Division of Health Statistics, Enrique Rubin de Celis and Jorge Salinas.

I would also like to thank my associates at the Division of International Health of the Johns Hopkins School of Hygiene, Carl E. Taylor, Timothy D. Baker and William A. Reinke, and A. Peter Ruderman, Economic Adviser of the Pan American Health Organization, for their valued help with various aspects of this project from its inception to completion. Needless to say, responsibility for any shortcomings in the study remains with the author alone.

I am greatly indebted to Miss Kathleen Hill for typing the many drafts that went into the preparation of this monograph.

Baltimore, Maryland

May, 1967

## TABLE OF CONTENTS

|   | <u>Page</u> |
|---|-------------|
| ABSTRACT  | ii          |
| PREFACE   | v           |
| INTRODUCTION                                      | 1           |
| Peru: An Overview                                 | 1           |
| Geography and Population                          | 1           |
| Historical Perspective                            | 3           |
| Government and Geopolitical Divisions             | 7           |
| Demography  | 9           |
| Education   | 14          |
| The Economy                                       | 21          |
| Health Conditions                                 | 24          |
| Implications for Health Manpower Policy           | 30          |
| Resources for Health Care                         | 33          |
| Health Care Systems                               | 33          |
| Planning for Health                               | 54          |
| <br>Part I: The Supply of Health Manpower<br><br> |             |
| 1. SUPPLY: GENERAL CONSIDERATIONS                 | 59          |
| Current Supply                                    | 59          |
| Future Supply                                     | 69          |
| 2. PHYSICIANS                                     | 79          |
| Current Supply                                    | 79          |
| Medical Education                                 | 99          |
| Future Supply                                     | 117         |
| 3. DENTISTS                                       | 123         |
| Current Supply                                    | 123         |
| Dental Education                                  | 131         |
| Future Supply                                     | 136         |

|   | <u>Page</u> |
|---|-------------|
| <b>4. PHARMACISTS</b>                                       | <b>139</b>  |
| Current Supply  | 139         |
| Pharmacy Education  | 145         |
| Future Supply   | 150         |
| <b>5. NURSES</b>  | <b>153</b>  |
| Current Supply  | 153         |
| Nursing Education   | 161         |
| Future Supply   | 174         |
| <b>6. PROFESSIONAL MIDWIVES</b>                             | <b>177</b>  |
| Current Supply  | 177         |
| Midwifery Education   | 183         |
| Future Supply   | 192         |
| <b>7. THE SUPPLY OF OTHER CATEGORIES OF HEALTH MANPOWER</b> | <b>195</b>  |
| <b>Technical and Auxiliary Personnel</b>                    | <b>195</b>  |
| Technicians   | 198         |
| Auxiliary Nursing Personnel                                 | 203         |
| <b>Environmental Sanitation Personnel</b>                   | <b>211</b>  |
| Sanitary Engineers  | 211         |
| Sanitary Inspectors and Auxiliaries                         | 212         |
| <b>Other Health Personnel</b>                               | <b>214</b>  |
| Social Workers  | 214         |
| Dieticians and Nutritionists                                | 215         |
| Health Educators  | 216         |
| <br><b>Part II: The Demand for Health Manpower</b><br><br>  |             |
| <b>8. DEMAND ANALYSIS: General Considerations</b>           | <b>217</b>  |
| Biological Demand   | 217         |
| Effective Demand  | 220         |
| Population-Manpower Ratios                                  | 223         |
| A Framework for Demand Analysis in Peru                     | 227         |

|   | <u>Page</u> |
|---|-------------|
| 9. CURRENT DEMAND   | 231         |
| Services  | 231         |
| Demand for Care by Insured Persons                                    | 241         |
| Cost  | 246         |
| Manpower  | 250         |
| 10. FUTURE DEMAND   | 259         |
| The Demand Model: Objectives and Constraints                          | 260         |
| Manpower Assumptions  | 262         |
| Productivity Assumptions  | 269         |
| Manpower Requirements   | 270         |
| Projected Costs   | 271         |
| Conclusions and Alternatives  | 275         |
| <br>Part III. The Future: Manpower Plans, Policies and Issues<br><br> |             |
| 11. BRINGING SUPPLY AND DEMAND INTO BALANCE                           | 281         |
| Physicians  | 282         |
| Dentists  | 287         |
| Pharmacists   | 290         |
| Nurses  | 300         |
| Midwives  | 307         |
| Technical Personnel   | 313         |
| Auxiliary Personnel   | 320         |
| Other Personnel   | 324         |
| 12. ISSUES IN HEALTH MANPOWER PLANNING                                | 329         |
| Health Care Organization  | 329         |
| Health Care Distribution  | 335         |
| The Present Situation   | 335         |
| A Policy for the Future   | 339         |
| Improving Manpower Distribution                                       | 348         |
| Manpower Planning: Organization and Research                          | 352         |
| Planning Organization: A Proposal                                     | 355.        |
| Needed Research   | 362         |
| Conclusion  | 367         |
| APPENDICES  | 369         |
| LIST OF APPENDIX TABLES   | 405         |
| REFERENCES CITED  | 406         |

## INTRODUCTION

The complex interrelationships that exist between a nation's health and its level of social and economic development make it impossible to consider the one independently of the other. This introduction reviews some of the factors extrinsic to the health sector that have an important bearing on health as well as on the sector itself, its priorities, resources, and organization.

### Peru: An Overview

#### Geography and Population

The third largest country in South America, Peru covers almost half a million square miles. Three natural geophysical regions are described: the narrow coastal strip running the length of the western border with the Pacific, the Andean highlands, and to the east, the jungle.

Varying in width from a few miles to more than 100, the coastal region comprises about 11 percent of the total area of Peru. With less than two inches of rainfall, most of this region is barren desert. Ports and major cities, including Lima, the capital, line the lower coastal region, while the upper coastal area, up to an altitude of 6500 feet, is sparsely populated and consists mainly of steep, poor lands.

The sierra, or highland area, comprises about 26 percent of the total territory. The irregular landscape of the Andes features cold and treeless pastureland contrasted with jagged snowcapped mountain peaks. To the south the many streams of the sierra drain into Lake Titicaca, which forms a natural boundary with Bolivia.

The region to the east of the Andes accounts for 63 percent of the national territory and is divided into two portions, the high and low jungle. The high jungle is situated at an altitude of one to three thousand feet, and has a temperate climate with moderate rainfall. The low jungle constitutes the Amazon Basin and has a typical subtropical climate with high temperatures throughout the year and heavy rains lasting from October to April.

Few nations have had to contend with such harsh geographic and climatic conditions as those found in Peru -- conditions which have resulted in marked regional variations in the patterns of living. While these variations have given Peru an exceptionally rich cultural heritage, they have also acted to retard social and economic development, and, as will be evident throughout this monograph, the distribution and delivery of health care.

The estimated population was 10.3 million in 1961 and 11.3 million in 1964. According to the 1961 census approximately 47 percent live in urban areas, though in terms of a more realistic definition of urban communities, this figure is probably closer to one-third. Slightly more than half of the population lives in the sierra, about two-fifths on the coast and a tenth in the jungle.

Ethnically, somewhat over half of the population is considered either white or mestizo (of mixed Indian and Caucasian parentage) and most of the remainder, Indian. Less than two percent are Negro or of Oriental extraction, and one percent are jungle Indians.

#### Historical Perspective

Indian tribes are believed to have settled in the Andean region as early as 2000 B.C., although it was not until the 10th and 11th Centuries A.D. that the territory of modern Peru became extensively populated. The first culture of importance in shaping modern Peru was that of the Incas which arose at the beginning of the 12th Century near Cuzco. During succeeding centuries the Incas expanded their empire to include the territories of modern Peru, Ecuador, and Bolivia.

Despite their many conquests, the Incas were not a warlike people. The rulers had a paternalistic spirit and distributed state-owned lands among the people and provided for their material well-being. The Inca civilization was notable for its many accomplishments in the fields of agriculture, road and bridge building, masonry, ceramics and weaving. (2)

By the time of the Spanish conquest in 1532, the Inca empire had become a highly centralized state with a rigid hierarchy that allowed the average man little initiative or mobility. Its organization was pyramidal with lines of authority leading to an apex without lateral connections. It was the inherent weakness of this sort of structure which facilitated the conquest of the empire by less than 200 soldiers under the command of Francisco Pizarro. (3)

The period immediately following Pizarro's conquest was one of strife. The Indians split into two groups, one persisting in efforts to maintain the empire, and the other resigned to accept Hispanization. A number of wars ensued, during which the native population was depleted by half.

Peru's colonial wealth was primarily based on the availability of an inexpensive supply of labor to work in agriculture and mining. Officials of the Crown and colonists alike obtained large tracts of land which they then distributed among the Indians in return for a tribute to be paid either in gold or personal services. Since most Indians had no gold, this system soon resulted in the virtual enslavement of much of the native population. Later, with the discovery of extensive mineral deposits in the Andes, more Indians entered into economic bondage to the mine owners by virtue of an Inca institution, the mita, which in the absence of a monetary system, had allowed for the payment of taxes by labor.

In 1569 Viceroy Toledo sought to ease the lot of the Indian by cancelling some of the land grants to officials who abused their subjects and by resettling portions of the dispersed Indian population in controlled villages under a system somewhat similar to that of the Incas. While these policies were enlightened in intention, Spanish authority was unfortunately too remote, cumbersome, and uninformed for effective implementation.

The revolutionary ideas that swept Europe and North America towards the end of the 18th Century soon had their effect in Latin

America. In 1821 the Armies of Liberation, led by Bolivar and San Martin, defeated the royalist factions in Peru and on July 28th, the Republic of Peru was proclaimed.

The aspirations of the leaders of the revolutionary movement for a democratic nation of small independent farmers soon foundered on the traditionalism of most of Peruvian society. The Indians, released from the limited protection afforded them by the colonial laws proscribing against the disposal of their lands, fell prey to the unscrupulous. Large landholdings became larger, and the Indians remained in bondage.

By the mid-1800's, the effects of the Industrial Revolution began to be felt in Peru: industry and commerce flourished, railroads were built along the coast and the remarkable Trans-Andean line was completed. Commercial agriculture, primarily based on cotton, began on a large scale in the coastal region.

The new economic prosperity was short-lived. War with Chile (1879-83) over the control of the nitrate deposits in southern Peru resulted in the loss of the disputed territory and a severe depression which lasted several decades.

By the turn of the century, the process of industrialization gradually resumed. To recoup heavy investment losses foreign bondholders assumed control of productive Peruvian industries which in turn encouraged additional foreign and domestic investments. The Indians of the highlands, little affected by the economic and political fluctuations of the coast, slowly became aware of possibilities for a

better life. As land pressures increased, so too did the migrations to the cities on the coast and agitation for land reform in the sierra.

The political history of much of the Republican Period is dominated by the rise and fall, usually by force, of a confusing array of contending political groups. Although rivalries were bitter, differences were more a matter of who controlled the government than of how the government was used as an engine for social and economic progress.

Slowly this pattern is undergoing change. Recent governments, most notably the Belaunde administration inaugurated in 1963, have made concerted efforts to promote the development of the whole nation and create a sense of national unity and purpose. But the process of integrating the extremely discordant segments of Peruvian society will be long and difficult. After centuries of apathy, mistrust, or hostility, the Indians, landowners, capitalists, workers, rising middle class, army and Church are now being asked to make common cause for the good of all. Economically there is a growing awareness of interdependence but politically and socially the chasms that divide are still great. Only as the high cost of perpetuating these chasms becomes apparent are ways being sought to bridge them. An important element in the attack against the traditional barriers to development will be, without doubt, the promotion of better health care for all Peru.

Government and Geopolitical Divisions

The government of Peru is headed by a president who is elected for a six-year term, and is prohibited by law from succeeding himself. The legislative branch is bicameral with 45 senators in one house and 140 deputies in the other. Each branch is elected at the same time as is the president and for the same six-year period. The franchise is compulsory for all literate citizens between the ages of 20 and 60 (18 if married), the literacy requirement effectively eliminating most of the Indian population from the vote and thereby placing most political power on the coast.

Governmental administration is carried out through 12 ministries and a variety of quasi-independent governmental agencies. Ministers are appointed by the president with the approval of Congress and serve at the president's pleasure. The Ministry of Health is the principal governmental agency concerned with health, though other agencies with important health functions include the Ministries of War, Air, Navy and Government, and two semi-autonomous insurance funds.

For administrative and political purposes the country is divided into 23 departments, plus the Constitutional Province of Callao which is treated as a department. The departments are in turn divided into 144 provinces and these into 1620 districts (1964 figures). Although there is a gradual tendency towards decentralization, political and administrative control of the country is still largely in the hands of the president by virtue of his power to

MAP OF THE DEPARTMENTS AND PRINCIPAL CITIES OF PERU



(\* Cities of 50,000+ inhabitants in 1961)

appoint the key departmental and provincial officials. Since departmental and provincial boundaries bear little relation to regional economic or social realities, these jurisdictions are seldom used in the manpower study. Districts, as the smallest political unit used in the national population census, are grouped according to the size of the urban population to facilitate study of the urban-rural gradient of manpower distribution.

### Demography

Population Growth The famous Inca system of knotting cords to register their subjects does not permit accurate estimation of the population of the Inca empire, but historians estimate the number to have been close to six million. The first census under Spanish rule was conducted in 1548 and enumerated a total of 8.2 million persons living approximately in the region covered by modern Peru. A century and a half later, in 1795, a second census revealed the terrible impact of colonialism on the Indian subjects: the population had declined to 1.2 million. Following independence, the population again began to rise and by mid-20th Century, as a result of falling death rates in the face of continued high birth rates, Peru had attained one of the most rapid rates of growth in the world.

The only two censuses conducted in this century were in 1940 and 1961. Using these as reference points, population estimates were made of the intercensal years by interpolation and for the future, by extrapolation. (Appendix A).

Using mid-1964 as the reference point for the health manpower study, the population of Peru was estimated to be 11,298,400,<sup>a</sup> based on an assumed annual growth rate of 3.1 percent. According to the National Bureau of Statistics and Censuses, this rate of growth is likely to continue, at least until 1980, unless prevailing patterns of mortality and fertility are modified. By 1974, the ten-year reference point for manpower projections, the population will have increased 36 percent to 15.4 million and by 1984, approximately 85 percent to 20.9 million. Although these estimates may well prove high, they at least introduce a measure of conservatism into the projection of manpower-to-population ratios.

Birth and Death Rates. Changes in age structure, as well as the incompleteness of birth and death registration have made it difficult to estimate accurately such indices as the birth rate or death rate, or to construct a life table for the Peruvian population. According to official registration data, the average birth rate during the 1940-61 intercensal period was 32.9 per thousand and the death rate, 12.5 per thousand. However, in seeking to

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<sup>a</sup>Excludes the jungle Indian population, variously estimated at between 100,000 and 150,000. Since data are so unreliable for this group they are usually not included in demographic analyses of the Peruvian population. With most tribes tending to move frequently and living distant from any organized communities it will be years before health services can be reasonably provided for them.

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 explain the observed intercensal population growth, demographers  
 estimate that the actual birth and death rates most likely averaged  
 48 and 26 per thousand, respectively. (4) By 1964 the birth rate  
 was still estimated at 48 though the death rate declined to about  
 18. (5)

Preliminary estimates suggest that the life expectancy at  
 birth for males and females during the period 1940-50 was about  
 34 and 35 years, respectively; and for the following decade, 46 and  
 48 years. (6) For 1961 it was 51 years for men and 54 years for  
 women. (7)

Age and Sex Distribution. The Peruvian population is young and  
 the current high birth rate will likely maintain it so during the  
 next several decades. In 1940 the median age was about 18.6 years,  
 in 1960 it was 16.7 years, and by 1980 the estimate is 18.0 years.  
 The distribution of the population by age group is given in Table 1.

Table 1. POPULATION DISTRIBUTION BY AGE: Peru, 1940, 1960, 1980<sup>a</sup>

| AGE GROUP<br>(years)                             | % DISTRIBUTION, BY YEAR |      |      |
|--|-------------------------|------|------|
|  | 1940                    | 1960 | 1980 |
| 0-4  | 16.4                    | 18.2 | 16.7 |
| 5-14   | 24.3                    | 26.4 | 26.7 |
| 15-44  | 42.1                    | 41.3 | 42.7 |
| 45-64  | 12.5                    | 10.5 | 10.7 |
| 65 and over                                      | 4.7                     | 3.6  | 3.2  |
| % under 20 and over 64<br>(dependent population) | 55.3                    | 58.9 | 57.4 |

<sup>a</sup> Boletín de Análisis Demográfico (ref. 3). Based on Table 4, p. 60.

It is evident that with such a high proportion of the population in the younger age groups, maternal and child health programs will have high priority for years to come.

Geographic Distribution. Throughout the world health officials have grappled with the difficult problem of ensuring that rural populations have adequate access to health services. The presence of a large Indian population living in the inhospitable Andean highlands has made this problem particularly difficult in Peru. An important element in the manpower study, then, was the quantification of the rural-urban gradient in the distribution of manpower resources, both as a basis for planning future policies and as a base-line against which to evaluate progress.

Accordingly, Peru's 1620 districts were grouped into five categories based on the urban population in each district at the time of the national census in 1961. These groups are (see Appendix I for district names):

- (1) the 20 districts comprising metropolitan Lima and including Callao
- (2) the 15 districts with an urban population of 50,000 up to 249,999.
- (3) the 6 districts with an urban population of 25,000 to 49,999
- (4) the 33 districts with an urban population of 10,000 to 24,999, and
- (5) the remaining 1546 districts with less than 10,000 urban population.

The estimated population in each group in 1964 is given in Table 2 along with certain other characteristics. It should be emphasized that these population groups are used primarily for illustrative purposes and the derived manpower-population ratios based on them cannot be interpreted rigorously. Nevertheless, this method of classification does help show how the availability of health manpower varies according to community size and suggests the general magnitude of the redistribution of health resources that may be necessary in the future.

Table 2. NATIONAL POPULATION CLASSIFIED ACCORDING TO SIZE OF URBAN COMMUNITY: Peru, 1964

| POPULATION IN DISTRICTS WITH (OR FORMING PART OF AN URBAN COMPLEX WITH) AN URBAN POPULATION IN 1961 OF | POPULATION <sup>a</sup> | % OF TOTAL POPULATION | % URBAN BY 1961 DEFINITION <sup>b</sup> | % ANNUAL GROWTH RATE |
|--|-------------------------|-----------------------|---|----------------------|
| PERU   | 11,298,000              | 100                   | 49                                      | 3.1                  |
| Metropolitan Lima  | 2,181,000               | 19                    | 98                                      | 6.3                  |
| 50,000-249,999   | 881,000                 | 8                     | 89                                      | 4.3                  |
| 25,000-49,999  | 294,000                 | 3                     | 81                                      | 5.3                  |
| 10,000-24,999  | 926,000                 | 8                     | 67                                      | 2.5                  |
| Under 10,000   | 7,016,000               | 62                    | 24                                      | 2.0                  |

<sup>a</sup>Estimates based on extrapolation of the crude 1940/61 trend towards urbanization and the totals adjusted to conform with the corrected 1964 population projection.

<sup>b</sup>This definition includes all communities, irrespective of size, with certain specified urban characteristics.

The trend towards rapid urbanization is evident. Even using the restrictive definition of "urban" as those towns with 10,000 or more inhabitants, the percentage of Peru's population living in urban areas increased from 20 in 1940 to 32 in 1961 and is estimated to pass 40 percent by 1974. Although these values give dimension to the tremendous migration of rural populations to the cities, most Peruvians still live in predominantly rural areas and will continue to do so for some time to come.

#### Education

The finding in the 1940 census that only about 40 percent of the population was literate had a strong impact on government educational policy in the ensuing years. The budget for education was rapidly increased, school construction given high priority, and intensive campaigns conducted to promote adult literacy. By 1961 the literacy rate among persons 17 years and older had increased to 60 percent despite a 54 percent increase in the population. Although gains were greatest in rural areas, the literacy rate of rural residents (39%) was still found to be far below that of urban residents (82%).

Education is almost entirely a governmental responsibility with over 85 percent of all primary and secondary school students and about 95 percent of university students in public sector institutions. The Ministry of Public Education is the principal agency concerned with education and expends approximately 85 percent of all sectoral funds.

The Peruvian school system includes four levels: pre-school, primary, secondary and higher education. Pre-school education lasts one year and is given free to children between the ages of four and six years. This level is not compulsory and is usually limited to the larger urban centers.

Primary education consists of one year of "transition" (between pre-school and the first grade) followed by five years of day classes, or occasionally, six years of afternoon or evening classes. Public primary education has been free and compulsory since 1905 but even today educational facilities do not reach a considerable proportion of the population.

For many years secondary school education was oriented towards preparing students exclusively to enter a university. This policy meant, however, that the many secondary school graduates who did not undertake university studies were poorly prepared for work in the national economy. To correct this situation changes were made in secondary school education in the National Education Plan of 1957. Under this reform, two systems of secondary school education were created: "regular" (comun) and technical. Students enrolled in both systems take three years of general studies and then split for the remaining two years, depending on their aptitudes and objectives. Those interested in university training enter the regular secondary school program to continue their studies of the sciences and humanities; the remainder enter technical schools for instruction in commerce, the industrial trades, or agriculture.

Of the 256,000 students enrolled in secondary schools in 1963, about 80 percent were in the regular schools, 9 percent in the industrial or trade schools, 9 percent in commercial schools, and 2 percent in agricultural schools. The number enrolled in the last year of the regular secondary school program in 1964 was approximately 28,000, this representing the potential pool of applicants for higher education, including training in the health sciences. From 1960 to 1964 this pool increased by an average of 3100 students per year.

The biggest problem of educational planners has been to expand school facilities fast enough so that not only would the needs of the growing population be met, but also a reduction made in the high proportion of children without access to education. In 1951 about 46 percent of the school-age population was in school. By 1963, despite a 79 percent increase in total enrollment, the percentage in school had increased to only 62. More than one million children, most of them living in the sierra, still had no access to the educational system.

Another difficult problem for educational planners has been the high attrition rate of students entering the system. According to Ministry of Education figures, only five percent of the students entering school in 1951 were in the last year of secondary school 11 years later. Although partial data from the cohort entering in 1957 suggest that the proportion retained up to the level of the fifth grade increased from 20 to 34 percent in the seven-year period, the dropout rate is still extremely high.

Until this century, the only source of higher education in Peru was the Main National University of San Marcos (Universidad Nacional Mayor de San Marcos, hereafter abbreviated as the University of San Marcos), second oldest university of the hemisphere. Founded in Lima in 1551 by Charles V of Spain, the University now includes the Faculties of Medicine, Law, Science, Humanities and Letters, Pharmacy, and Dentistry, and the Schools of Midwifery, Education, and Economic and Commercial Sciences.

The expansion of higher education has been prodigious during the past several decades, going from only one national (i.e., publicly financed) university in the 1920's to 16 in 1964. Nine of the new universities were opened since 1955 alone. Besides the public institutions, approximately 10 under private sponsorship have been organized in recent years, though their share of the total enrollment is still low (5%).

The number and distribution of the enrollment in all the institutions of higher learning is shown in Table 3 for the years 1960 and 1963. The most conspicuous changes during this period are three: a 50 percent increase in the total enrollment; an increase from 11 to 20 percent in the proportion studying to become teachers; and a decline from 16 to 11 percent in the proportion studying the health sciences. However, because enrollment has risen so rapidly, the number enrolled in the health sciences has remained almost a constant 5000 throughout the period. As will be evident in the chapters on supply, declining enrollments at the nation's faculties

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**Table 3. STUDENTS ENROLLED IN INSTITUTIONS OF HIGHER EDUCATION:  
 NUMBER ENROLLED; DISTRIBUTION OF ENROLLMENT BY FIELD OF  
 STUDY; PERCENTAGE MALE: by Year: Peru, 1960 & 1963<sup>a</sup>**

| FIELD OF STUDY      | YEAR            |               |
|---------------------|-----------------|---------------|
|                     | 1960            | 1963          |
| <b>All Students</b> | <b>30,787</b>   | <b>46,167</b> |
| Number              | 30,787          | 46,167        |
| % Male              | 74.2            | 72.8          |
|                     | % of Enrollment |               |
| Arts and Letters    | 29.6            | 26.3          |
| Education           | 11.4            | 20.0          |
| <b>Sciences</b>     | <b>(53.6)</b>   | <b>(51.0)</b> |
| <b>HEALTH</b>       | <b>16.2</b>     | <b>10.7</b>   |
| Social              | 16.5            | 18.7          |
| Natural             | 5.8             | 5.9           |
| Engineering         | 9.3             | 9.0           |
| Agricultural        | 5.8             | 6.7           |
| Other               | 5.4             | 2.7           |

<sup>a</sup>Peru, Inst. Nac. de Planif., Ofic. de Progr. Educativa,  
Alumnos Matriculados en las Universidades Nacionales y Particulares  
del Pais, Nov. 1964 (mimeographed)

of pharmacy and dentistry, and the stabilization of enrollment at the San Marcos Faculty of Medicine at a level more in accord with school capacity, have combined to hold total enrollment in the health professions virtually unchanged despite the creation of four new medical schools since 1960.

The number of schools and faculties training professional health personnel has increased rapidly in recent years. Since 1955, 13 new institutions have been opened, bringing the total in 1964 to 29. During the remainder of the decade at least four new schools of nursing each to be affiliated with a university, are scheduled to be opened. The number of educational institutions, by type, operative in 1966 is shown in Table 4.

Table 4. PROFESSIONAL SCHOOLS AND FACULTIES IN THE HEALTH SECTOR;  
DURATION OF CURRICULUM: Peru, 1966<sup>a</sup>.

| SCHOOL OR FACULTY               | NUMBER | YEARS REQUIRED AFTER<br>SECONDARY SCHOOL DEGREE |              |
|---------------------------------|--------|---|--------------|
|                                 |        | Preparatory                                     | Professional |
| Faculties of Medicine           | 7      | 2   | 5            |
| Faculties of Dentistry          | 2      | 1   | 4            |
| Faculties of Pharmacy           | 3      | 1   | 5            |
| Faculty of Sanitary Engineering | 1      | 0   | 5            |
| Schools of Nursing              | 16     | 0   | 3-5          |
| Schools of Midwifery            | 2      | 0   | 4-5          |
| School of Public Health         | 1      | 0   | Variable     |
| Schools of Social Work          | 4      | 0   | 4            |

<sup>a</sup>The Faculty of Veterinary Medicine (Lima) is excluded since it primarily serves the needs of the agricultural sector.

The major problems faced by Peru's institutions of higher learning can be summarized as follows:

- (1) New universities have been opened too fast for the government to be able to finance and staff them properly. In many institutions there are a large number of faculty vacancies, in others poorly qualified personnel have been employed on a temporary basis, and in some the programmed capacity exceeds the number of qualified applicants. The lack of even a nucleus of full-time teaching staff at many institutions has resulted in fragmented instruction and impeded curriculum reform.
- (2) Educational programs are frequently disrupted by student demonstrations, political activity and involvement in academic policy. One of the most striking examples of this type of problem is discussed in the chapter on physician supply.
- (3) In many institutions curricula are ill-suited for the requirements of a modern society.

These difficulties, as they relate to institutions training health personnel, are discussed in the appropriate chapters on supply

Among the institutions of higher learning, only those engaged in training teachers, artists and artisans are under the administration of the Ministry of Public Education. The universities, once established by legislative enactment, enjoy a high degree of autonomy from direct governmental control. Although the Inter-

university Council (Concejo Interuniversitario) exists to enforce certain minimum standards at all publicly financed institutions of higher learning, it has had little effect on educational policy. As a result, considerable differences may exist between institutions offering the same academic degree as regards both curriculum content and duration of studies.

#### The Economy

The Peruvian economy in recent years has been characterized by a remarkably rapid and sustained rate of growth. In the period 1950-65 the average annual real increase in the gross national product (G.N.P.) was 5.6 percent and of the per capita G.N.P., 3.0 percent. During the five-year period, 1960-65, the average annual increases were even higher, averaging 6.6 and 3.6 percent respectively. (8) Nevertheless, despite these encouraging signs of progress, the Peruvian economy was still a long way from providing the nation with an acceptable standard of living; by 1964 the per capita G.N.P. had reached only S/. 8450 (US \$315), less than one-third that found in most countries with a substantial amount of industrial development.

During this period of rapid growth the economy has undergone substantial structural change. From 1950 to 1963 the contribution of agriculture declined from 35 to 22 percent, and would have been even smaller were it not for the enormous expansion of the fishmeal industry. This decline was matched by increases in the participation of most of the other major sectors of the economy, principally commerce, government and manufacturing. Only mining, contributing about

percentage of value added, has remained essentially unchanged at five percent of the G.N.P., throughout this period.

Most segments of the labor force have benefited from the increase in income. During the period 1950-63 the real average annual increase in wages was 3.5 percent, in non-governmental salaries, 4.0 percent, in governmental salaries, 3.4 percent, and in wages of agricultural laborers, 3 percent. (9) However, for the one-third of the labor force working as independent small farmers, income remained close to the subsistence level and the annual increase was well below the national average.

The Peruvian economy displays wide regional differences. Most economic activity is concentrated in the cities and towns of the coastal region, particularly Lima. In 1961 the 22 percent of the population living in the capital city produced 42 percent of the national income and the economic dominance of Lima would have been even greater were it not for the many fishmeal factories and guano deposits located along the coast to the north and south. Lima's preferential position as regards transport, services, and the labor and money markets have made it exceedingly difficult to achieve a more equitable distribution in the industrial development of the nation.

Even in agriculture, the mainstay of the Andean economy, the coastal region leads both in per capita production and value of product. According to a 1959 survey the value of coastal agricultural products exceeded those of the sierra by 32 percent and the

coastal farmer was almost three times as productive as his counterpart in the highlands. (10) The failure of the agricultural sector in the highlands to improve productivity and total output has meant that a substantial proportion of Peru's foreign exchange must be used to import food stuffs for the growing population.

Government Expenditures. Government expenditures have come to represent a progressively larger component of the Peruvian economy. In 1950 all central government expenditures amounted to only 11.1 percent of the G.N.P. By 1955 this had risen to 14.3 percent and, after a temporary decline in the late 1950's due to a recession, government participation in the economy continued to increase annually until by 1964 it equalled 19.0 percent of the G.N.P. Through this period local government participation remained almost constant at about 0.8 percent. (11)

Public sector expenditures on health, expressed as a percentage of total government expenditures, have remained relatively constant in recent years, varying from 13 to 16 percent during the period 1958-64. About 92 to 95 percent of the health expenditures are for operating costs and the remainder for investments. The cost of the health sector is analyzed in greater detail in Chapter 9.

Health and Economic Development. The relationship between health programs and economic development has been much discussed in recent years but so far little of a quantitative nature is known. Recently the Peruvian government has made several major policy decisions affecting national development which also have important

implications for the growth of health services. One example is the priority being given by the Belaunde administration to the development of the potentially rich high jungle region. It is hoped that by developing transport, market and agricultural extension facilities, colonization will be promoted and agricultural production increased. The prompt development of health services in this region is considered essential to the success of these efforts.

In 1963 a riverboat program was inaugurated in the low jungle to bring health and other community services to populations living along the banks of the Amazon River and its major tributaries. Although the requirements for health personnel are still small, it is expected that permanent health facilities with resident personnel will be gradually established throughout the region.

The social and economic problems impeding development in the highlands are complex and progress will be slow. Notwithstanding, the marked acceleration in land reform, educational, and community development programs that has occurred since 1963 will unquestionably result in a growing demand for health care.

#### Health Conditions

The importance of having accurate information on health conditions for the planning of services is unquestioned. Such information is also important in manpower planning, but not necessarily to the same degree or in the same way.

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One method of predicting manpower demand -- to be discussed in Chapter 8 -- directly converts "diseases" into "manpower requirements", and hence necessitates precise information on health levels. However, in most methods of demand projection, a direct linkage between disease indices and manpower requirements is not attempted. Morbidity and mortality statistics enter into demand projections more as qualitative guides to the types of health workers that should be prepared, the orientation they require, and where they should be assigned, than as quantitative determinants of demand. For this reason, the following sections describe only in general terms the principal health problems of the nation and their relation to manpower planning.

Mortality. Almost one-half of all deaths (47%) occur in children under five and close to one-third in those under one. Even in urban communities with relatively good access to health care, the infant mortality rate is exceeded only among persons over 75 years of age. According to official registration the infant mortality rate declined gradually from about 128 per thousand live births in 1940 to 95 per thousand in 1963 but more realistic estimates place the present rate near 200. (12)

Tabulations by cause of death are available only in those districts where there are sufficient physicians to ensure reasonably complete professional death certification. By 1964 the Division of Health Statistics of the Ministry of Health was able to obtain professional certification in 177 of Peru's more than 1600 districts,

covering approximately 43 percent of the national population. Since districts with professional certification are primarily urban in nature, the population has relatively good access to medical care and cannot be considered representative of the country as a whole. Despite this bias, approximately two out of every five deaths in these districts can be considered preventable according to modern standards of health care. As can be seen in Table 5, infections and parasitic diseases account for approximately one-third of all deaths, including 22 percent by pneumonia and tuberculosis alone.

Table 5. - TEN LEADING CAUSES OF DEATH IN DISTRICTS WITH PROFESSIONAL CERTIFICATION: Peru, 1964<sup>a</sup>

| CAUSE   | % OF TOTAL |
|---|------------|
| Pneumonia & acute bronchitis                    | 14.4       |
| Diseases of early infancy, including infections | 13.6       |
| Gastroenteritis & dysentery                     | 8.9        |
| Cardiovascular                                  | 8.4        |
| Tumors (all kinds)                              | 7.6        |
| Tuberculosis (all forms)                        | 7.2        |
| Accidents                                       | 6.9        |
| Measles   | 3.6        |
| Avitaminosis & other deficiencies               | 2.4        |
| Chronic bronchitis                              | 1.9        |
| SUBTOTAL  | 74.9       |
| All other causes                                | 25.1       |

<sup>a</sup>Peru, Min. de Salud Publica y A.S. Nacimientos, Defunciones y Defunciones Fetales en Distritos con Certificacion Profesional, Peru, 1964. (1966) Adapted from Table 14.

Inadequate nutrition contributes to the high mortality caused by infectious disease. Estimates made by the National Institute of Nutrition suggest that almost one-third of rural coastal residents and two-thirds of rural sierra residents consume less than 75 percent of the calories and proteins considered essential for an adequate nutrition. (13)

Diseases of the gastrointestinal tract are also an important cause of mortality, accounting for 8.9 percent of the total in 1964. The lack of potable water and sewage disposal, evident in

Table 6, has tended to maintain the high incidence of these diseases.

Table 6. PERCENTAGE OF URBAN AND RURAL POPULATION WITH POTABLE WATER AND SEWAGE DISPOSAL: Peru, 1965<sup>a</sup>

| POPULATION CLASSIFICATION | % OF POPULATION IN CLASSIFICATION | % WITH        |                 |
|---------------------------|-----------------------------------|---------------|-----------------|
|                           |                                   | Potable Water | Sewage Disposal |
| PERU                      | 100                               | 19            | 17              |
| Urban <sup>b</sup>        | 42                                | 70            | 65              |
| Rural                     | 58                                | 4             | 0               |

<sup>a</sup>Peru, Inst. Nac. de Planif., Ofic. Sectorial (Salud). Plan Sectorial de Salud, Dec. 1966, adapted from Table 3, p. 8.

<sup>b</sup>For purposes of environmental sanitation surveys, "urban population" includes communities of 2000+ inhabitants.

Peru's mortality data, even though based on the urban two-fifths of the population, are in marked contrast with those found in the highly industrialized countries of Europe and North America.

**Cancer, heart disease, and stroke, accounting for more than 70 percent of all deaths in the United States, cause only about 17 percent of the deaths in Peru.**

**Morbidity. Morbidity statistics are notoriously incomplete in most countries and Peru is no exception. There is compulsory reporting of certain communicable diseases but published rates are grossly underestimated. With about half of the population not utilizing medical services, the failure of physicians to report all notifiable conditions treated represents only a comparatively minor source of error.**

The five leading conditions reported, together accounting for two-thirds of the total, are influenza, tuberculosis, measles, pertussis and helminthiasis. Other communicable diseases of importance include typhoid and paratyphoid, infectious hepatitis, tetanus neonatorum, brucellosis, leishmaniasis, venereal diseases, leprosy and smallpox. An outbreak of smallpox occurring towards the end of 1963 resulted in more than 1000 cases. Malaria eradication has made considerable progress in recent years despite technical and fiscal problems. By 1963 only about 1700 cases were reported, most of these being from the jungle areas.

Classification of hospitalizations and professional visits according to diagnosis, though not very useful in assessing the overall health problems of a country, are nevertheless of great value in understanding how most health resources are being allocated. Table 7 gives data for 1964.

Table 7: TEN LEADING CAUSES OF PUBLIC SECTOR HOSPITAL BED-DAYS AND AMBULATORY CARE VISITS: Peru, 1964<sup>a</sup>

| HOSPITAL BED-DAYS     |                                | AMBULATORY CARE VISITS |                              |
|-----------------------|--------------------------------|------------------------|------------------------------|
| Cause                 | % of Bed-Days<br>(N=6,281,000) | Cause                  | % of Visits<br>(N=7,980,000) |
| Tbc (all forms)       | 24.7                           | Acute respiratory      | 14.3                         |
| Pregnancy & delivery  | 7.7                            | Teeth and gums         | 8.8                          |
| Accidents & violence  | 7.1                            | Accidents & violence   | 7.7                          |
| Leprosy               | 2.3                            | Ill defined & senility | 7.7                          |
| Mental illness        | 5.8                            | Well child             | 6.7                          |
| Rest of inf. & paras. | 5.0                            | Pregnancy & postpartum | 5.8                          |
| Tumors (all kinds)    | 4.0                            | Tbc (all forms)        | 4.8                          |
| Cardiovascular        | 3.3                            | Rest of inf. & paras.  | 4.8                          |
| Acute respiratory     | 3.1                            | Gastroent. & dysent.   | 4.0                          |
| Gastroent. & dysent.  | 1.7                            | Cardiovascular         | 3.8                          |
| SUBTOTAL              | 69.3                           | SUBTOTAL               | 68.4                         |
| Rest of causes        | 35.3                           | Rest of causes         | 31.6                         |

<sup>a</sup>Peru, Min. de Salud Publica, Ofic. Sect. de Planif., Plan Nacional de Salud, 1966-70 (1965). Adapted from Table 31, p. 84.

<sup>b</sup>Detailed data are not available for the private sector. About 9% of all bed-days and 51% of all ambulatory visits were provided in this sector in 1964.

Several findings are of particular interest. First, almost 32 percent of the bed-days were due to tuberculosis and leprosy. Despite a considerable reduction in the incidence of hospitalization for these conditions in recent years they continue to represent a major drain on available resources. That acute infectious illness should account for only 9.8 percent of the bed-days is also noteworthy. These conditions cause much morbidity and mortality, particularly among children, but for diverse cultural, institutional and geographical reasons children

have less access to much of the hospital system than do adults and hence have a relatively low incidence of hospitalization.

Curative services accounted for almost 90 percent of the ambulatory services provided in the public sector and probably even a higher percentage in the private sector. Based on the average observed concentration of 3.2 prenatal visits per woman under care in 1964, only about one in four women received any health services prior to delivery. The situation was similar for well child care. Even assuming most visits were made by children under two, probably no more than 30 percent of this age group was seen for routine health supervision during 1964.

#### Implications for Health Manpower Policy

Different countries use widely differing criteria in determining how scarce resources should be allocated within the health sector. In many, including Peru, great emphasis has traditionally been placed on providing adequate medical services for the employed urban population. By virtue of the importance of this group, both for economic development and political stability, its health needs have been met first.

Gradually priorities are changing as greater attention is given to the health problems of the large rural population and even of certain segments of the urban population. With planning based progressively on the criteria of cost and expected benefit, program emphasis has shifted towards those problems where the return, measured in deaths or morbidity avoided, promises to be greatest. The effect these new priorities will have on manpower policy is considerable.

The Planning Office has recognized that the principal health problem of the nation is malnutrition. (14) However, since the solution to this problem depends more on the agricultural sector and the improvement of the economy as a whole, the contribution of health personnel will primarily be confined to carrying out appropriate research projects, to nutrition education, and when necessary, to distributing supplemental food to special risk groups. The demand for specialized manpower to work in these programs will be limited.

The second priority includes those communicable diseases subject to control by immunization. While the death rates due to diphtheria, pertussis, measles, smallpox, poliomyelitis, and similar conditions amenable to immunologic control are not high in absolute terms, the disability they produce is considerable and the ease with which they can be controlled makes their persistence unacceptable. Programs aimed at reducing the incidence of these conditions will require substantial numbers of nursing and auxiliary personnel.

In third place are the wide variety of infectious and parasitic diseases primarily resulting from unsafe water supplies and poor environmental sanitation. Throughout Peru the morbidity caused by these conditions is enormous and in much of the highlands and jungle the gastroenteric diseases are a primary factor in the high death rates among children. Besides large investments of capital to provide for the installation and distribution of potable

water, substantial numbers of professional and auxiliary sanitary personnel will be required.

Despite the reduction in mortality due to tuberculosis, this disease continues to represent a major economic and social loss. Even by devoting almost one-quarter of the nation's bed-days to this disease, only a small part of the need for care has been met. Obviously, less expensive ways of attacking this disease must be found if the incidence is to be further reduced. With program emphasis shifting away from hospitalization and towards immunization with B.C.G., community case-finding, and home and ambulatory clinic care, the demand for well-trained auxiliary personnel will be increased.

Only one in three babies is born under the supervision of a trained birth attendant and the proportion of expectant mothers receiving even minimal prenatal and postpartum care is still smaller. Eventually all mothers should receive professional maternity care, but this is a distant goal. As an intermediate solution to this problem, priority must be given to training auxiliary midwifery personnel to practice under supervision.

The common denominator of these priority areas is the need for large numbers of trained auxiliary personnel to function under the supervision and guidance of public health professionals.

A . . . . .  
**Resources for Health Care**

**Health Care Systems**

The manner in which a nation's health care resources are

organized and services delivered tells much about its social structure. This is especially true in Peru where sharp cleavages of an economic, social and political nature have resulted in the evolution of a variety of distinct organizational patterns for meeting the health needs of the nation. The next six sections describe these patterns, or "systems of health care", and the ways in which they influence both manpower supply and demand. A final section gives comparative data for the several systems to facilitate placing each in the perspective of the entire health sector.

For analytical purposes, six major systems of health care can be described: Ministry of Health, Employees' Social Insurance Fund (Caja Nacional de Seguro Social del Empleado), Workers' Social Insurance Fund (Caja Nacional de Seguro Social Obrero), health services of the armed and police forces, charity, and the private sector. Within the last three systems are encompassed a number of smaller and administratively discrete subsystems that serve different client populations.

Variations in the historical antecedents as well as in methods of financing the six systems have led to wide differences in the quality and comprehensiveness of health care that each provides. Without any mechanism to coordinate their growth, problems of

duplication and omission of health services have developed. A major task of the Health Sector Planning Office during the next decade will be to develop suitable mechanisms for coordinating the activities of these now autonomous systems of health care so as to improve resource distribution and utilization.

Charity System. Certainly one of the oldest and still among the most extensive arrangements for medical care in Peru arose out of the efforts of the early settlers of the Spanish colonial period. As in Europe, the Catholic Church initially assumed responsibility for the sick poor. Before independence, welfare boards (juntas de beneficencia) were established in many of the more important communities of Peru under Church sponsorship and administered locally by Church officials in cooperation with representatives of the landowner class. Besides providing what amounted to custodial care for the sick, the juntas operated orphanages, cemeteries, and other charitable activities. Wealthy and poor alike made donations or bequests in land and goods to the juntas, the income thus obtained providing the basic support for these institutions. Throughout the colonial period the charity hospitals<sup>a</sup> almost exclusively served the poor since the few wealthy families preferred to arrange for their medical care at home.

With independence, the charity hospitals continued and indeed

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<sup>a</sup>Since virtually all health facilities operated within the charity system are hospitals, reference is usually made in this monograph to the "charity hospitals". In a few communities small clinics (asistencias publicas) not associated with hospitals may also be found.

grew in number and vitality. Gradually the number of families able to pay for at least some of their health needs increased as did the potentialities of hospital-based medical care. Extra facilities were added to the more prosperous hospitals and somewhat more favorable accommodations and meals offered to those able to pay a small fee.

By the early 1900's most of the charity hospitals were finding it difficult to improve facilities and services at the pace demanded by the evolving medical sciences. Incomes remained fixed on the inefficiently managed properties and the administrative structure of the juntas was poorly adapted to meet the rapidly changing requirements of medical care. New government hospitals competed for staff and few persons were willing to accept the long hours and very inadequate remuneration implicit in charity hospital employment. And yet only as recently as 1961 the charity hospitals accounted for 40 percent of the nation's hospital beds and for many communities represented the only health facility readily accessible.

At no time during the existence of the charity hospitals could they be properly regarded as functioning within a "system of health care" in the sense that this implies inter-institutional organization and an administrative hierarchy. Each hospital is completely independent of all others and functional relationships either don't exist or are purely casual. The charity hospitals can be roughly grouped into three levels according to location, size and quality of care offered (1964 data):

(1) Lima and other major cities. This group includes nine large (250+ beds) general hospitals with a combined total of 4080 beds, plus a 1150-bed mental hospital. All hospitals in this group operate large outpatient clinics and most have a substantial salaried medical staff plus a large number of associate staff that render service on an ad honorem basis. Five hospitals are used for teaching students of the health professions and hence have tended to provide relatively good care. Financial support of the nine general hospitals is comparatively good and some ancillary services are available. As with virtually all charity hospitals, however, physical facilities are old and quite inadequate judged by modern hospital standards.

(2) Larger provincial and departmental capitals. Twenty hospitals of intermediate size (76-250 beds) with a total of 2365 beds are found at this level. Minimal outpatient services may be offered but most staff time is spent on inpatient care. Professional staff often consist of only two salaried physicians who assume responsibility on alternate days, plus several more unpaid physicians who bring private patients in for hospitalization. Laboratory and other ancillary services are rudimentary and medicines frequently out of stock.

(3) Smaller provincial and district capitals. In this group are 34 small (less than 76 beds) hospitals with a total capacity of 1001 beds. The extreme shortage of staff,

facilities and materials usually permit little more than custodial and maternity care. In some hospitals an auxiliary is available to provide a limited amount of outpatient services. Staff usually consist of a part-time physician, one or two nurses from one of the Catholic nursing orders, perhaps a midwife, and a limited number of auxiliaries, usually without training.

Aware of the impossibility of replacing even a portion of the charity hospitals in the foreseeable future, the Ministry of Health and the National Health and Welfare Fund (Fondo Nacional de Salud y Bienestar Social)<sup>a</sup> have assumed a growing role in their fiscal support. Although the precise amount expended by these hospitals is not known, it is estimated at about 150 million soles in 1964. In many institutions the subsidy provided by the F.N.S.B.S. amounted to over 90 percent of the operating budget. In the past these subsidies have been given free of fiscal, administrative, or quality control.

As administrative boards of the charity hospitals have come to recognize that their resources will never be adequate to meet the requirements of modern health care, they increasingly express willingness to turn the administration of these hospitals over to the government to operate. This has been done in a few cases but the Ministry

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<sup>a</sup>The F.N.S.B.S. is physically located in the Ministry of Health but is semi-autonomous from Ministry control. The Fund derives revenues from a variety of special taxes, notably on alcohols, and invests these in a wide variety of health and welfare projects.

of Health has been reluctant to accept transfer too rapidly because of its primary commitment to its own growing network of hospitals. It is generally believed that within a decade all but the biggest charity hospitals located in Lima will be under direct Ministry control. The absorption of such a large number of poorly equipped and staffed hospitals will impose heavy strains on Ministry financing in the coming years.

Armed and Police Forces. From early colonial times to the present the military, and subsequently the police forces, have been regarded as a particularly important element for the maintenance of political and social stability in Latin America. Because of this role, they have long enjoyed preferential access to health services, hospitals for the care of the military having been among the first such institutions established by the Spanish settlers.

The health services of four ministries are included in this group, the essential characteristics of each in 1964 being shown in Table 8. In addition to hospital-based care, each service also provides for ambulatory care facilities according to its special needs. All services make use of limited contracts with public and private sector institutions to meet the health needs of persons distant from service-owned facilities.

Precise information on the population actually using health services available to members of the armed and police forces is not available for reasons of national security. Rough approximation suggests, however, that in relation to the population effectively served (perhaps 3%) they have the resources to provide more and

Table 8. ARMED AND POLICE FORCES' HEALTH SERVICES: Facilities and Coverage: Peru, 1964

| MINISTRY            | HOSPITALS |                    | MAXIMUM POPULATION SERVED <sup>a</sup>  |
|---------------------|-----------|--------------------|---|
|                     | No.       | Beds               |   |
| War                 | 4         | 1056               | 130,000 (including dependents) plus about 68,000 civilian population attended by 90 rural posts |
| Navy                | 2         | 374                | 190,000 (including dependents)  |
| Air Force           | 0         | Contracts for care | 10,000 (including dependents)   |
| Government & police | 1         | 421                | 270,000 (including dependents)  |
| <b>TOTAL</b>        | <b>7</b>  | <b>1851</b>        | <b>600,000</b>  |

<sup>a</sup>The actual population using these services is probably less than half as great due to restrictions on use, distance, and other factors.

better health care than is possible in other public sector health systems with the possible exception of the Employees' Insurance Fund.

Collectively the seven wholly-owned military and police hospitals operate almost seven percent of the nation's hospital beds and the total system utilizes about one-tenth of the medical and one-sixth

of the professional nursing personnel.

The armed and police forces' system of health care is important not only as a substantial consumer of health manpower, but also as a producer of professional and auxiliary health workers. In Lima both the Hospital Militar and Hospital de Policia have schools of nursing as well as training programs for technical and auxiliary personnel.

While most categories trained by the military are readily usable in the civilian sector, certain types of auxiliaries do not have such dual capability. This is most notable in the case of the sanitario militar who, after receiving a three-month course in elemental health practices and first aid, is used as the primary health worker at isolated military posts and in battle situations. Later sections will consider the need for greater standardization and coordination of military and civilian training programs so that the training contribution made by the military will not be lost when trainees return to civilian life.

Ministry of Health. The role of the central government in supporting and operating health services for the general population has been a rapidly changing one. The origins of the Ministry of Health can be traced back to 1903 when a Directorate of Public Health was created in the

Ministry of Development (Fomento). Subsequent constitutions (1920 and 1933) called for increasing central government responsibility for the health of the nation and implementing mechanisms rapidly evolved -- though actual programs remained limited. In 1942 the present Ministry of Public Health and Social Assistance was created and by the 1950's began to assume its current role as the nation's single most important system of health care. (15)

Alone among the major health systems, the Ministry of Health has developed an extensive program of preventive and public health services. The primary institutional means of providing these services for larger communities and cities is the health center or more recently, hospital-health center, and for progressively smaller rural communities, the medical post (posta medica), health post (posta sanitaria), and "peoples' drugstore" (botiquin popular). Table 9 summarizes the types of services offered by the different non-hospital health facilities and the number in 1956 and 1964.

The growth of hospital facilities under Ministry direction has been very rapid. In 1952 the Ministry had 26 hospitals with 3075 beds and by 1964 this had increased to 63 hospitals with 9761 beds, a 317 percent increase in bed capacity for the 12-year period. The hospital-health center construction program, initiated in 1962 with funds from the loan of a German consortium, is specifically aimed at providing integrated preventive and curative services to communities that previously lacked them. Original plans called for 12 hospital-health centers with a total of 1708 beds. On completion of this

**Table 9. NUMBER AND FUNCTIONS OF THE MAJOR TYPES OF NON-HOSPITAL HEALTH FACILITIES OPERATED BY THE MINISTRY OF HEALTH: Peru, 1956<sup>a</sup> and 1964<sup>b</sup>**

| TYPE OF FACILITY   | PRINCIPAL FUNCTIONS AND ADMINISTRATIVE RELATIONSHIPS  | YEAR |      |
|--------------------|---|------|------|
|                    |   | 1956 | 1964 |
| Health Center      | Located in larger towns. Provides maternal and child health services, sanitation, communicable disease control, and outpatient medical care; maintains health statistics and promotes health education. | 12   | 91   |
| Medical Post       | Located in smaller towns. Provides services similar to a health center but on a smaller scale; attended by a physician who supervises health posts and peoples' drugstores.                             | 23   | 190  |
| Health Post        | Located in small rural communities. Provides minimal nursing, public health, and first aid services; attended by a <u>sanitario</u> and supervised periodically by a physician.                         | 30   | 251  |
| Peoples' Drugstore | Located in small rural communities or other population centers without adequate access to a pharmacy. Operated by an auxiliary who sells a limited variety of medicines at low cost.                    | 53   | 139  |

<sup>a</sup>Peru, Min. de Salud Publica y A.S., Aspectos de Salud Publica en el Pais, (1962), pp. 6, 42.

<sup>b</sup>Health Sector Planning Office data. Includes 34 health centers associated with hospitals and 64 popular drugstores associated either with a medical or health post. Investment plans for 1964-65 called for construction of 6 more hospital-health centers, 113 medical and 72 health posts.

program in 1964, contracts were signed for another 685 beds to be placed in operation by 1967. With the charity hospitals and private sector financially unable to build, and the military and social insurance programs both with a relatively adequate hospital system, virtually all new hospital construction will be by the Ministry of Health. These new beds, added to the large number of charity hospital beds being transferred to Ministry control, make it probable that within ten years the Ministry will administer well over half of Peru's bed capacity.

In order to better administrate its health programs, the Ministry has divided the country into 14 "health areas" (areas de salud), which are in turn subdivided into "health units" (unidades de salud). In some parts of the country where facilities and services have not yet reached a minimum level of comprehensiveness or administrative complexity, services are administered by health units unaffiliated with a health area. In 1964 there were 7 of these independent health units plus 57 more that formed part of an established health area.

Ambitious construction plans of recent years are now facing the Ministry with a serious shortage of trained personnel. Several Ministry facilities have had to remain closed or only partially open due to inability to complete their staffs. This problem has become particularly acute with the completion of the first series of hospitals and no immediate solution is in sight.

Progress has been made, however, in improving the quality of health manpower employed in Ministry programs. In 1959 the Ministry established a Training Center (Centro de Capacitacion) in Lima to

give supplementary public health training to professional personnel and pre-service training to auxiliary workers. In 1964 the Center was expanded and converted into a School of Public Health. Almost the entire annual output of the School's educational program has gone to staff Ministry programs

Besides the more usual spectrum of public health, hospital and outpatient services, the Ministry also administers other important programs such as food distribution, malaria eradication and rural sanitation, as well as the Institutes of Occupational Health and Nutrition, and the Special Public Health Service (Servicio Especial de Salud Publica).

Workers' Social Insurance Fund. Virtually all of the important social transformations occurring in Latin America today can in some way trace their origins to the dual phenomena of urbanization and industrialization. These processes, just beginning on a grand scale in the Peru of the early 1900's, represented a major force in awakening the desire of the laboring class for the benefits of social insurance. Growing numbers of families left the farms to swell the migratory stream to urban areas. Medical services had never been available in the country but their absence was no longer acceptable in the city.

Though government still drew its support primarily from the upper classes and military, stability depended in large part on meeting at least some of the demands of the increasingly vocal unions. Responding to these pressures, and following patterns already established in many European countries, the Peruvian government created

in 1936 the Workers' Social Insurance Fund. Responsibility for general supervision was assigned to the Ministry of Labor and Indigenous Affairs, though in most matters Fund administrators were autonomous of direct government control. Enabling legislation called for the obligatory inclusion of all wage earners with an annual salary of less than S/. 3,000 (about US \$720 in 1936) and subsequent provisions were made to include the self-employed and domestics on a voluntary basis. Salaried employees -- the white collar workers -- were specifically excluded from benefits, and while no explicit provision was made for the farm laborer, his isolation and poverty generally acted to keep him out of the program. By 1964 about 447,000 workers<sup>a</sup> were covered by the Fund, representing about 13 percent of the economically active population and 4 percent of the total population.

During the early years of its existence the Workers' Fund was financed by a 4.5 percent tax paid by the employer and 2.5 percent by the worker (3.5% if self-employed). Rising costs and increased benefits made it necessary in 1950 to increase the employer's contribution to six percent, the worker's to three percent, and to add on a two percent contribution by the government along with the income of certain excise taxes. Even with these rates, still in effect in 1964, the Fund has had serious difficulties meeting its obligations. For a number of years the government defaulted on much of its share and estimates of the losses due to underpayment of the employer-

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<sup>a</sup>According to unofficial estimates the actual number may be up to 20% greater. See Appendix I for details.

employee share vary between 15 and 25 percent. Health expenditures at per insured worker in 1964 were about 1200 soles (\$44).

From the very outset the program has sought to provide a fairly broad spectrum of benefits, including coverage for the risks of sickness (excluding work-associated illness which is covered by commercial insurance), maternity, disability, old-age, and death. Medical care is free and, within the limits of availability, quite comprehensive. Cash benefits during illness start after a two-day waiting period and cover 70 percent of the worker's wages for a maximum of 26 weeks.

In view of continual financial difficulties, the Fund has not yet been able to extend benefits to dependents. In 1964 only children under eight months and born to insured (i.e., working) mothers were entitled to care. If pressures should grow in the coming decade to extend coverage to all dependents, Fund administrators will be faced with a problem of major proportions. Facilities and budgets are already overtaxed and the prospect of tripling or quadrupling the number of insured would require radical solutions.

The great majority of all insured workers are now treated in facilities owned by the Fund. When the program was first established, however, hospital and ambulatory care had to be contracted from the crowded charity hospitals and private clinics available in that day. These soon proved inadequate to meet the rising demands for medical care and it was decided that the Fund should build its own facilities. By 1941 the 870-bed Hospital Obrero of Lima was opened, the first social security hospital in Latin America. Within a few years 14 additional hospitals were completed for a total of 2617 beds, most

also serving a number of satellite clinics and medical posts. The need for facilities has outgrown the Fund's ability to finance new ones and hence it has returned on a limited basis to the practice of contracting services in areas not served by their own hospitals.

Early in the history of the Workers' Fund it became apparent that the common practice of depending entirely on part-time medical personnel was inconsistent with providing high quality care. As a result, the Lima Hospital Obrero was the first general hospital in the country to utilize a substantial number of full-time (six hours) physicians and this practice has now extended to most of the other major facilities.

Employees' Social Insurance Fund. To the Peruvian deeply aware of the differences that exist between the social strata of his society, it was not surprising that a separate insurance program should be established in 1948 for white collar employees. Starting with 121,000 beneficiaries, the Employees' Fund increased enrollment to 437,000 by 1964, almost the same number as insured by the Workers' Fund. An additional 71,000 wives were estimated to be eligible for maternity benefits. Approximately 57 percent of the insured employees and 52 percent of the wives live in metropolitan Lima.

The experience of the Workers' Fund convinced those who drafted the new program of the importance of creating a strong financial base. The higher and more reliable income base for salaried employees enabled the combined tripartite contribution to be reduced from the 11 percent level used in the Workers' Fund to a total of 6 percent of monthly incomes for government employees and 7 percent for those in

the private sector. The government's share is only 0.5 percent. Despite the proportionately smaller contributions per capita health expenditures are considerably higher than in the Workers' Fund, averaging about 1400 soles (\$52) in 1964.

The basic benefits available to employees are in most respects similar to those provided to wage earners. The most notable exception is that in the employees' program uninsured wives are given maternity care after six months' gestation. Both programs cover the complete cost of most drugs required by the insured patient and neither levy user charges.

The principal difference between the programs is in the manner in which health care is obtained. Unlike the wage earner, the salaried employee may choose to obtain those services to which he is entitled either in the private sector, the Fund reimbursing the practitioner, hospital, or pharmacy according to a fee schedule, or directly from facilities operated by the Fund.

This double choice arrangement represents a concession granted by the Employees' Fund to the medical profession as the price for being able to operate a "closed" (i.e., patients are admitted and treated only by salaried physicians) hospital system. When the Employees' Fund was established in 1948, the absence of facilities obliged the Fund to provide care through the private sector. Ten years later, as the huge Hospital Central del Empleado neared completion, the issue of an "open" or "closed" staff came into sharp focus. Fund administrators felt they could control neither costs nor quality if the new hospital were operated on an "open" basis.

and indeed they hoped eventually to be able to provide all services in their own facilities. For its part, the medical profession saw the narrow stratum of paying patients on the verge of being absorbed by this second social insurance system, and they reacted in a pattern familiar throughout the world. Strikes, boycotts, expulsion from the Peruvian Medical Federation of physicians seeking employment in the new hospital -- all were tried. Truce was finally obtained but at the price of a dual system of medical care.

The evolution of health care in Peru has and will continue to be strongly influenced by the decision to maintain the "free selection", fee-for-service arrangement in the Employees' Fund. Most significantly, the private sector has been preserved as a major provider of health services.

Use of the private sector -- now providing approximately one-half of all services rendered to insured employees -- has had both its advantages and liabilities. Whereas the Workers' Fund felt obliged to build hospitals throughout the country, the Employees' Fund has had much greater flexibility in meeting the needs of beneficiaries distant from its own facilities. Fund administrators point, however, to the continuing problems inherent in a fee-for-service reimbursement method of payment, i.e., holding down costs, preventing abuse by both doctors and patients, and ensuring high quality care.

While the Employees' Fund did not embark on bed construction in quantity, quality was not ignored. Anxious to impress the white collar worker of the importance the government attached to his health

and welfare, both the 1200-bed Lima (only 847 in operation in 1964) and 239-bed Arequipa Fund hospitals were built to dominate the skyline of their respective communities.

The strong financial base of the Employees' Fund has also allowed it to have much better staff-bed ratios than is the case at most Peruvian hospitals. In 1964 there was one full-time (six-hour) doctor available per three beds and an overall ratio of three staff per bed.

Private Sector. The private sector encompasses such a wide variety of mechanisms for providing health services that brief characterization is difficult. Included in the sector are indigenous and professional practitioners, "for profit" and voluntary hospitals, religious institutions, and health programs operated by industrial and agricultural enterprises.

Services provided by indigenous practitioners unquestionably form a quantitatively important part of the private sector. The rich heritage of past civilizations has provided a well-spring of native health practices that are even today used by millions of persons living beyond the effective reach of modern health and other community services. Even in the larger towns indigenous healers continue to do a flourishing business, reflecting both the strength of traditional modes of behavior and the paucity of modern medical care for the poor. The qualitative aspects of indigenous health systems have been studied in a number of communities by social scientists (16, 17) interested in promoting the acceptance of modern medical practices.

These data are not useful, however, in suggesting the volume of

services provided, their approximate cost, or most importantly, whether or not it would be desirable or indeed feasible to utilize native practitioners to provide certain services in coordination with the government health program. While recognizing the general relevancy of these questions to manpower planning, it was decided that the limited study resources available did not permit adequate analysis. No attempt is made to project demand for their services, though the potential usefulness of indigenous midwives will be discussed in later chapters.

Quite distinct from the services provided by indigenous practitioners are those rendered by the independent professions of medicine, dentistry, pharmacy and midwifery. The general characteristics of private practice for each type of practitioner are described in the chapters on supply.

The private sector includes extensive hospital facilities which in 1964 amounted to 3686 beds in 116 hospitals. The distribution of these beds, by hospital ownership and size of hospital, is shown in Table 10.

The small size of most private sector hospitals is striking. Approximately 54 percent of the beds are in hospitals with 50 or less and no hospital exceeds a capacity of 150. Many are the result of an individual physician converting a pre-existing building over to hospital use and as such are often poorly adapted and equipped to meet the needs of modern hospital care. As more charity hospitals are modernized and new government facilities opened, the incentives for operating private institutions may well decrease.



The Systems in Perspective. Table 11 presents comparative data for the six systems of health care to help place each in perspective.

**Table 11. COMPARISON OF SELECTED CHARACTERISTICS OF THE PUBLIC AND PRIVATE SYSTEMS OF HEALTH CARE: Peru, 1964**

| SECTOR AND SYSTEM            | % OF POPULATION ELIGIBLE <sup>a</sup> | NO. OF HOSPITALS (N=267) | % OF BEDS (N=27,597) | % OF TOTAL MANPOWER TIME <sup>b</sup> |        |                  |
|------------------------------|---------------------------------------|--------------------------|----------------------|---------------------------------------|--------|------------------|
|                              |                                       |                          |                      | Physicians                            | Nurses | Auxiliary Nurses |
| <u>Public Sector</u>         | (100)                                 | (151)                    | (87)                 | (67)                                  | (91)   | (90)             |
| Min. of Health               | 100                                   | 63                       | 35                   | 26                                    | 31     | 42               |
| Employees' Ins. <sup>c</sup> | 4                                     | 2                        | 4                    | 8                                     | 16     | 8                |
| Workers' Ins.                | 4                                     | 15                       | 10                   | 11                                    | 15     | 13               |
| Armed & Police               | 3-6                                   | 7                        | 7                    | 11                                    | 18     | 3                |
| Charity                      | 100                                   | 64                       | 31                   | 10                                    | 12     | 20               |
| <u>Private Sector</u>        | 100                                   | 116                      | 13                   | 33                                    | 9      | 10               |

<sup>a</sup>The percentage actually using each system varies widely depending on factors such as economic and geographic accessibility.

<sup>b</sup>Excluding time spent in teaching and in other governmental agencies.

<sup>c</sup>About one-half of the total care provided is purchased from the private sector.

Two findings emerge from these data: that the public sector is very much larger than the private sector and that the insurance funds and the armed and police forces' system have far more resources available, in relation to their client populations, than do the remaining systems of health care. These phenomena, coupled with a pronounced urban-rural imbalance in the distribution of health manpower, are the dominant "facts of life" with which this study will be repeatedly concerned.

Planning for Health

Only recently has planning been accepted by the nations of Latin America as a means to accelerate the pace of economic and social development. Throughout most of the 1950's, plans, when developed, were usually limited in scope and the result more of external pressures by international lending agencies than a response to internal needs.

In Peru, the necessity of health planning was first recognized by the Ministry of Health in 1957 when, during the process of administrative reorganization, it was decided to create an Office of Planning, Coordination and Evaluation. This Planning Office was ahead of its time and for diverse reasons was not put into operation. In 1961 the Ministry of Health again took measures to establish a small planning unit, largely based on the hope that this would help maintain program continuity despite the frequent change of ministers.

This unit functioned only sporadically and had little impact on the administration of health services. These early efforts had their effect, however, and by 1962 there was growing support among health officials for a mechanism to coordinate the activities of all public and private agencies working in health.

The nation, too, was ready for planning and in October 1962 a National System for the Planning of Economic and Social Development in Peru was created. Article V provided for the organization of sectoral planning offices in each of the ministries and other major operating agencies of the government. In January 1963 the Ministry of Health, building on its experience of previous years, established

the first of these sectoral offices.

As part of the national planning system, the Planning Office is responsible for the technical coordination and orientation of all agencies, public and private, that carry out activities in the health sector. Technically it is responsible to the National Planning Institute and administratively to the Ministry of Health.

During the first 18 months of its operation the Planning Office divided most of its efforts among three activities: training of health planners, the health manpower study, and the rationalization of Ministry of Health administrative services. Additional time was spent in establishing programming offices in six other health services of the public sector and in implementing program budgeting in the Ministry of Health. One experimental programming area was designated in each of the three natural regions of the country and in 1964 field experience was gained in planning methodology.<sup>a</sup>

Work on a national health plan was deferred during this formative period until early-1965, by which time the Office had finished training its personnel and knew more clearly how to proceed. In July of

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<sup>a</sup>For a detailed description of the planning method, see Health Planning: Problems of Concept and Method (Pan American Health Organization, Washington, 1965), and for the Peruvian approach to health planning, "Planning for Health in Peru -- New Approaches to an Old Problem" by Thomas L. Hall (Am. J. of Public Health, 56, 8:1296-1307, (Aug.) 1966.

1965 a first draft of a five-year plan covering the period 1966-1970 was completed. Information obtained during its preparation proved of great importance to the health manpower study and in certain phases of the two projects, notably in the three experimental programming areas, there was close coordination of efforts. However, for reasons outlined in Chapter 8, neither the Latin American planning method nor the specific projections developed in the National Health Plan for 1966-70 were used to estimate future manpower demand.

- 57 -

**Part I**

**THE SUPPLY OF HEALTH MANPOWER**



## Chapter 1

### SUPPLY: GENERAL CONSIDERATIONS

The fundamental purpose of a manpower study is to anticipate the future demand for human resources at a time when decisions can still be made to meet it. However, before a decision can be made to alter the production of a given manpower category, the projected demand for this category must be balanced against the projected supply to see whether a change is required. This chapter defines how the concept of "supply" has been used in the Peru study and describes some of the methodological problems encountered in supply analysis.

#### Current Supply

"Current supply" refers to the professional, technical, and auxiliary personnel active<sup>a</sup> in the health sector in mid-1964. Data on the characteristics of current supply were deemed essential in order to (1) estimate attrition rates, (2) have a base-line from which to make supply projections, and (3) provide clues on the interaction between supply and demand that could be useful in projecting demand.

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<sup>a</sup>The characteristics of temporarily or permanently retired health workers are usually omitted due to lack of data.

Measuring Current Supply. In 1957 the University of San Marcos Faculty of Medicine conducted a census of professionally active physicians and the results were published along with related hospital data.<sup>18,19</sup> Four years later, a general census was made of the population, and by 1966 it was anticipated that some tabulations would be available for selected health professionals. Since both studies were dated, limited in coverage, and lacked important qualitative information, it was decided at the outset of the Peru study that a special census of health manpower would be required.

In no other phase of the study were so many problems encountered as in the census. Indeed, it was only after completing a third nationwide census that the results were considered acceptably complete. The problems and results of the three censuses are described in some detail since they may be of help to other countries engaged in manpower analysis.

1st Census (August - December, 1963). Long census forms were prepared in 1962 and following a pre-test in a community near Lima, were printed in quantity. On review in 1963 the manpower study group considered the forms excessively detailed but decided to use them anyway to avoid the expense of reprinting. Forms were sent with covering instructions to the two social insurance, four armed and police forces' health services, and to the various regional administrative units of the Ministry of Health.

Ministry officials were made responsible not only for their direct administrative dependencies but also for the private

sector and the charity hospitals. Followup letters, phone calls, and personal interviews were used to accelerate the slow pace of the census.

To help in planning and evaluating the census, preliminary estimates were first made of the number of health workers expected in each category. For physicians, the estimate was made as follows: total number of doctors licensed since 1910, minus an estimated 200 lost due to out-migration, minus an estimated 400 deceased or retired, equals the number expected. Similar estimates were made for the other categories of health workers.

After five months only about 30 percent of the total expected response had been received, most being from Ministry of Health personnel. Even within the Ministry, however, the response was very uneven. Many forms were completed by service and non-professional administrative personnel who were explicitly excluded from enumeration, and the private sector was almost completely neglected.

In retrospect the administrative machinery in virtually all of the central units which were sent forms and instructions was inadequate to carry out a census. Few persons read the instructions carefully and frequently all responsibility was delegated to a statistical clerk who distributed forms and then remitted only those that were voluntarily handed in. Professionals were particularly remiss about completing the census forms and auxiliaries

that tried to get them to comply were in a poor position to do so. The census form was too long and at times

difficult to understand, and some of the questions seemed unrelated to the legitimate interests of the government.

Lack of experience with this type of questionnaire, suspicion that the results might have financial repercussions, and inadequate explanation of the reason for the census all contributed to the poor response.

2nd Census (January - March, 1964). Shortened forms were prepared and used. Four professionals from the Planning Office and Ministry of Health spent almost five weeks each travelling predetermined routes in order to cover all of Peru outside of Lima and Callao. In each community visited (generally those with 5000+ inhabitants) the professional made arrangements with local health officials for completing the census in Ministry and charity system facilities, and in the private sector. Census enumerators were hired locally as necessary. Since the social insurance systems and the armed forces indicated they would soon be remitting their completed forms with good coverage, these institutions were not visited. In Lima and Callao six auxiliaries of the Planning Office and the Ministry spent three months walking all the streets of the capital to enumerate those in the private sector. Personnel working in public sector hospitals were to be enumerated by the appropriate central office under the supervision of Planning Office staff.

Early impressions of the second census were very favorable and large numbers of completed forms were received. By the end of April, however, the completed forms on hand accounted for only about 56 percent of the expected number of professionals, varying from a low of 44 percent of the pharmacists to a high of 61 percent of the dentists. Furthermore, the estimated omission rate was so varied in different parts of the country that national projections could not be made based on those already enumerated.

The poor results of the second census showed that too much reliance was still being placed on the local authorities to conduct the census. Assuming that there already was excessive centralization of authority in Lima, staff members of the manpower study had been reluctant to take complete responsibility for census execution. Presumably the findings were of interest to the local health units and in any event they would be responsible for keeping the information up to date. Additional delays results in the census of health personnel working for the social insurance funds and the armed and police forces; administrative control in these institutions proved to be neither as prompt nor absolute as originally expected.

In Lima it became evident that the lack of tight supervisory control over the census enumerators, a badly neglected aspect of the census due to other urgent responsibilities of the field staff at that time, was leading to

incomplete coverage and low output. Even under the best of conditions, auxiliary personnel could not complete more than eight or ten interviews daily since their relatively low status meant frequent delays, call-backs, and other frustrations. The shortened questionnaire did help considerably, however, since many forms could now be filled out "on the spot" in several minutes, rather than invariably requiring a call-back as in the first census.

3rd Census (April - August, 1964). Census forms were further shortened (Appendix C) and partially precoded. Four professionals from the Planning Office staff again went to the provinces and this time personally visited the great majority of public and private sector institutions. Alphabetized IBM lists of persons previously enumerated were compared with payroll lists and those omitted were identified and interviewed. In contrast with the previous censuses the third census emphasized rapidity and completeness of coverage at the sacrifice of some accuracy. If an individual was not available or it became apparent that much time would be lost in waiting to obtain the interview, friends and associates were consulted and approximate information covering most of the necessary items was obtained. When only the age or year of graduation was known, the other item was estimated. Much of the actual census work was done personally by professionals since this allowed more rapid access to other professionals than in the case of auxiliary personnel. In Lima, two members of the

Planning Office staff visited all of the major hospitals and  
with the assistance of auxiliaries used the same procedures  
of payroll review to identify almost 2000 health workers miss-  
ed in the two previous efforts. An additional number of  
doctors, dentists, and midwives working exclusively in the  
private sector which had been missed in the three months  
spent walking all the streets of the capital, were identified  
in the phone directory and were telephoned in order to obtain  
as much information as possible. Though a telephone census  
would appear to be an efficient procedure, much difficulty was  
met in persuading those contacted to give the necessary infor-  
mation. In reviewing the experience of the three censuses, the procedures  
which proved to be of most importance can be summarized as follows:

- (1) The personal visit of a well-oriented health professional  
to all institutions operating in the health sector.
- (2) Use of short forms, particularly for auxiliary personnel,  
which allow most of the information to be obtained from  
existing records or from work associates when personal in-  
terviews are not practical.
- (3) Prompt coding and perforation of census cards to permit  
frequent revision of alphabetical lists of those already  
enumerated.
- (4) If work is delegated locally, the preparation of a master  
list of those to be enumerated to facilitate followup if  
the delegated work is not completed.

(5) Prior publicity can help but will not eliminate problems of misunderstanding and reluctance to provide personal information.

(6) Close supervision of field work done by auxiliary census enumerators, particularly in the private sector.

Three important problems affecting census accuracy merit comment.

The first, most pronounced among physicians but also evident among other professional groups, was that of obtaining reliable information about the hours worked per week and types of professional activities engaged in. The principle concern expressed was that the information might be used for tax or other prejudicial purposes. Perhaps 30 percent of those working in the independent professions appeared to somewhat under-report the hours they spent in their jobs, while about half that many gave the impression they were inflating their replies. Over-reporting was most prominent in the public sector where the hours "contracted for" were given and not the hours worked, though this tendency also existed in the private sector when a physician took into consideration hours when he was "on call," but not actually working, or where he wished to inflate his hours of private practice for reasons of prestige. However, in all professions but dentistry the total number of work hours reported per week (about 40) appeared consistent with what could be expected.

The second problem had to do with identifying professionals retired (temporarily or permanently) from active service. When a conscious effort was made to find such individuals through information supplied by their working colleagues, an appreciable number were

located. Since this technique was used effectively only in the last census, the omission was high nationally.

In retrospect, the decision to enumerate only those professionals found active in their profession was a major weakness in the P<sub>1940</sub> study. The question of whether the large number of dentists, pharmacists, and midwives who were not found was due to a poor census or because they were no longer professionally active cannot be conclusively answered. In view of the techniques used in the third census and the good results obtained in the enumeration of physicians and nurses, it has been assumed that few active dentists, pharmacists and midwives were not found. In the future, however, it would be desirable to eliminate any doubts by (1) developing a master list of all graduates and (2) tracing a sample of those not found by regular enumeration procedures.

Lastly, in the census of technical and auxiliary personnel it had been planned to include many different types and grades of auxiliary workers. Particular attention was to be given to relating the length and type of occupational training to the requirements of the job. Such a refined analysis ultimately proved impracticable due to the marked differences found in job training and classification, and indeed in the interpretation of the questions asked. The census enumerator not infrequently was faced with situations where job classifications or descriptions bore little relation to the actual job, and training was either non-existent or applied neither to the job nor job classification. Because of these difficulties, many of the original personnel categories were dropped.

The classification of "training received" was a continuing source

of confusion, even for the few categories of auxiliary personnel that came under study. For example, some auxiliaries would list up to five years of "inservice training", presumably because they had been in employment that long. Lacking standards of what constituted minimally-acceptable training, it was difficult to know which tabulations would be most appropriate for even those auxiliaries with pre-employment training. The final decision was to exclude inservice training from analysis, and for pre-employment training, to set arbitrary and generally low standards of what constituted a "trained" worker for each category. Those having the requisite number of weeks of pre-employment training were classified as "trained" for the category under consideration, the rest being regarded as "untrained". Using such empirical standards, rough estimates of the existing supply of trained technicians and auxiliaries were made as a basis for determining future training needs.

The possibility of using lists of health workers such as those kept by pharmaceutical companies, professional schools, professional registries, professional societies, and the police and tax bureaus to construct a master list was carefully considered but rejected. The most important reason was that for the information required and the variety of health workers to be studied, no list or series of lists could have avoided the necessity of doing an actual field census. Hence the considerable effort at compiling and alphabetizing such lists would have been largely wasted, except to use as a check list to estimate census omission. In retrospect this decision was probably justified, though master lists would have been very important had it not

been decided to repeat the census to ensure adequate coverage and accuracy.

In characterizing certain aspects of both the supply or demand for professional health manpower, use is made of the concept of "full-time equivalent" (F.T.E.) personnel. When applied to professionals employed as faculty in a teaching institution or working for a governmental agency, F.T.E. status is assumed to equal 39 hours worked per week, the amount worked by most full-time public employees. In teaching institutions it is assumed that one full-time professor equals two half-time professors or 13 part-time professors (based on three hours per week per part-time professor). In the analysis of current demand, F.T.E. status is calculated by dividing the total number of hours worked per week by respondents divided by the number of respondents. Depending on the profession this varies from 32 to 42 hours per week, in most cases centering around 39 to 42 hours. By converting "hours worked" into F.T.E. personnel, the task of comparing the way different institutions use their manpower resources is greatly facilitated.

#### Future Supply

A projection is necessarily based on certain assumptions about what will happen in the future. Sometimes these assumptions may be so unquestioned as to make the projection equivalent to a "prediction". Often this type of projection is not possible, particularly in a period of rapid change, and a more cautious approach based on alternative assumptions is indicated. Because of the high and variable rates of

loss observed among Peruvian health professionals, this latter course was adopted and three projections of future supply were made.

Two variables are involved in projecting supply, the future output of trained health personnel, and attrition over time. The assumptions, sources of data and methods of analysis used for estimating each of these variables are described below.

Future Output of Health Workers. Projections of the output of Peru's training institutions were based on data obtained from a special survey. The following information was sought:

Professional Faculties and Schools

Number of graduates and revalidations of foreign professional degrees, by year and sex (1904-63).

Enrollment by year of study and sex; number repeating studies when available (1954-64).

Number of applicants for admission and of those rejected for lack of space, number considered qualified for admission (1960-64).

Amount of money spent (1961, 1963) and amount of money budgeted (1964); by expenditure category.

Programmed intake, planned changes in the length and/or nature of the curriculum, and in the entrance requirements (1964-67).

Number of faculty positions budgeted, filled, and additional faculty positions desired; by faculty rank and time (i.e., part-time, half-time, etc.). For nursing and midwifery schools, the basic profession (physician, nurse, etc.) of the employed faculty (1963 or 1964 depending on year of visit).

Assessment of the adequacy of the physical facilities and plans for new construction or renovation (1964).

Schools for Technicians and Auxiliaries

Number of graduates, by year (1904-63).

Number enrolled, by year of study (1964).

Programmed intake, planned changes in the length and/or nature of the curriculum, and planned changes in entrance requirements (1964-67).

Educational budget (1964).

Depending upon the profession under study, certain questions relating to quality or specific problems were added. Interviews were held with either the dean or school director at most of the institutions surveyed.

The starting point for projecting the "probable output" of new health workers was the enrollment, by year of study, in 1964, subsequently updated to 1966 for all professions but dentistry. The student attrition rate was estimated for each profession and applied to the enrollment in order to project the number of graduates, by year of availability for employment for the decade 1964-73. Factors such as the availability of qualified applicants, planned changes in the intake of new students, and schools scheduled for opening were taken into consideration as necessary.

The number of professionals likely to validate foreign-earned degrees was estimated by extrapolating recent trends and added to the output of Peruvian schools. For physicians, a special survey was conducted among medical schools in Latin America and Spain in order to better estimate the number of Peruvians likely to return in future years.

The anticipated output of national and foreign schools in 1973 was then multiplied by ten to show the effect of continuing this rate of production for another decade. Since both the population

and economy will have grown considerably by 1974, the projected output for the second decade represents a minimal estimate of what is likely to happen.

Estimating Losses. The problem is simply stated: If 1000 doctors (dentists, etc.) are professionally active in 1964, how many will remain active 10 or 20 years later? Unfortunately, the bases did not exist to construct a life table for the entire Peruvian population, much less for any of the health professions. The Ministry of Foreign Affairs had no information on the number of professionals that had left the country. Use of vital statistics data to identify those who had died proved impracticable. Information available from professional associations was too incomplete to be used for estimating the rate of removal per decade. Lacking these or other potential sources of information, two empirical methods were used to estimate losses as a function of time.

Life Table Method. This method consists of selecting a life expectancy curve assumed to approximate the experience of Peruvian health professionals and then applying the derived rates to each ten-year cohort of licentiates<sup>a</sup> to estimate the number surviving to a given year. The way this method was used to estimate physician deaths prior to 1964 is shown in Table 1-1.

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<sup>a</sup>Cohorts are based on the period in which professionals were authorized to practice in Peru. For those trained nationally "licensure" is synonymous with "graduation", though for those trained abroad there is usually a difference of one or two years.

Table 1-1. ESTIMATED NUMBER OF PHYSICIANS SURVIVING TO 1964  
(Life Table Method): Peru<sup>a</sup>

| DECADE  | NEW PHYSICIANS<br>LICENSED DURING<br>DECADE | PHYSICIANS EXPECTED TO<br>SURVIVE TO 1964 |      |
|---------|---|---|------|
|         |   | Number                                    | %    |
| 1914-23 | 193   | 80  | 41.7 |
| 1924-33 | 441   | 303                                       | 68.7 |
| 1934-43 | 594   | 514                                       | 86.5 |
| 1944-53 | 1435  | 1389                                      | 96.8 |
| 1954-63 | 3324  | 3304                                      | 99.1 |
| 1904-63 | 5987  | 5590                                      | 93.2 |

<sup>a</sup>Life tables used were from the University of Maryland (Abridged Life Tables for Total, Male, and Female Population: United States, 1961 (Table 2-1); Average Remaining Lifetime in Years at Specified Ages, by Color and Sex: Death Registration States, at Ten-Year Intervals, 1900-02 to 1959-61). The average age at licensure is assumed to be 28 years. Each cohort of Peruvian doctors is assumed to have the same expectancy of surviving to 1964 as white American males of the same age had about nine years earlier. This means that Peruvian physicians were estimated to have about one year less life expectancy than American males of the same age.

Use of this method presents two major difficulties. The first problem is that of selecting an appropriate life expectancy curve for Peruvian health professionals. In this study the curves used were for white American males and females of the same age as Peruvians graduating from each of the several professions, but for a period approximately ten years earlier than when each cohort graduated. For example, Peruvian nurses licensed at an assumed age of 20 years during the decade 1914-23, were presumed to follow the same mortality pattern that 20-year-old white American females did in the period 1909-11. The assumption is that in each decade the increase in Peruvian life expectancy was some ten years behind the American

experience. While objections can be raised concerning these or any other assumed mortality curves, in practice the final estimate for the number surviving will vary little irrespective of the assumptions used. This is because most Peruvian health professionals are young (median age is usually less than 35), and hence by any standard, subject to high survival rates.

The second problem is more serious. Since the life table method contemplates only death as a cause of removal, professions subject to a high rate of out-migration (doctors), early retirement (nurses and midwives), or change of job (pharmacists and dentists), are subject to optimistic projections. For this reason, projections of future losses are made using the cohort method.

Cohort Method. This method compares the number of physicians, dentists, etc., licensed in each decade with the number found active in the health manpower census corresponding to the same cohorts of licentiates. By this means the loss per decade, as a function of time, is obtained. The observed loss rates are then applied to each cohort of professionals active in 1964 to determine the number likely to remain active in one and two decades hence. The key assumptions of this method are that the base-line census was accurate and that factors affecting the loss rate will continue unchanged. Other than these important limitations, cohort analysis avoids such problems as estimating out-migration, retirement, and death rates since all causes of loss are included.

The cohort method is ideally suited to a normal pattern of attrition. According to this pattern the loss rate is almost negligible

during the first few years after graduation, increases slowly during the next three or four decades, and then increases sharply as each cohort enters the older age groups. Unfortunately, this pattern applies only partially to Peru. The principal finding of the health manpower census, described in detail in subsequent chapters, was that a greater proportion of young health professionals have left active practice than have older ones.

Given this situation, how should the cohort method be applied? Will those lost to the profession during the first decade after licensure return to the profession in the second decade or not, or will they follow some other pattern of attrition? Lacking adequate grounds to decide whether these high rates will be continued or not, three alternative hypotheses were used:

Hypothesis I: Present Retention Without Return. This hypothesis assumes that once a health professional has left his occupation or the country, he will not return. For example, it was found that about 13 percent of the doctors licensed in the period 1954-63 were not professionally active in Peru in 1964. Only eight percent of the doctors licensed in the previous ten years (1944-53) had similarly left the profession. In estimating future losses by this hypothesis, it is assumed that the same proportion (13%) of the 1954-63 cohort of licentiates will remain inactive in 1974 as was the case in 1964.

Hypothesis II: Present Retention With Return. Termed "improved retention" in the text, this hypothesis assumes losses are transitory and that each cohort, as it ages, will experience the

same loss rate as did the next older cohort. Using the same example cited above, this would mean that the 87 percent retention for doctors licensed in the period 1954-63 would increase to 92 percent retention by 1974 in order to conform with the experience of doctors licensed in the period 1944-53. Overall, this hypothesis is probably the most realistic one for the majority of Peru's professional groups. As the health sector expands, some of those who previously left their profession because of inadequate work opportunities or to study abroad will likely return to active practice.

Hypothesis III: Maximum Retention. Even Hypothesis II assumes a substantial and permanent loss of health workers. In order to indicate how many professionals would be potentially available assuming only those losses resulting from death or disability, a third set of loss rates was postulated. For a cohort of professionals licensed in, say 1954-63, this assumes a 4 percent loss by 1964, 7 percent by 1974, 10 percent by 1984, 30 percent by 1994, and 80 percent by 2004. No corrections are made for sex or for secular changes in the mortality experience of different cohorts. This theoretical rate is based partly on the experience of those cohorts of Peruvian professionals in which attrition has been low and partly on the estimated death rates at the present time. The projection obtained using this hypothesis, when compared with the other projections, is useful in demonstrating the potential reserve of unutilized health manpower available.

Future Supply. Table 1-2 shows how the future output of medical graduates and the alternative hypotheses about attrition are combined to project the supply of active physicians. In the example given, the projections for 1974 vary from 8540 to 9110. Projections for 1984 are similarly derived, using a ten-year extrapolation of the 1973 output of physicians as the estimated output during the decade, 1974-83.

Table 1-2. ESTIMATED NUMBER OF ACTIVE PHYSICIANS IN 1964 AND 1974<sup>a</sup> (Cohort Method): Peru

| DECADE<br>WHEN<br>LICENSED | PHYSICIANS           |                                |                         | % REMAINING ACTIVE IN 1974<br>(by Hypothesis) |    |     | NUMBER ACTIVE IN 1974<br>(by Hypothesis) |      |      |
|----------------------------|----------------------|--------------------------------|-------------------------|---|----|-----|--|------|------|
|                            | Licensed             | Active<br>in 1964 <sup>b</sup> | % Remain-<br>ing Active | I   | II | III | I  | II   | III  |
|                            | 1914-23 <sup>c</sup> | 193                            | 59                      | 31  | 0  | 0   | 0  | 0    | 0    |
| 1924-33                    | 441                  | 266                            | 60                      | 31  | 31 | 20  | 140                                      | 140  | 90   |
| 1934-43                    | 594                  | 568                            | 96                      | 60  | 60 | 70  | 360                                      | 360  | 420  |
| 1944-53                    | 1435                 | 1324                           | 92                      | 92  | 96 | 90  | 1320                                     | 1380 | 1290 |
| 1954-63                    | 3324                 | 2891                           | 87                      | 87  | 92 | 93  | 2900                                     | 3070 | 3100 |
| 1964-73 <sup>d</sup>       | (4390)               | 0                              | --                      | 87  | 87 | 96  | 3820                                     | 3820 | 4210 |
| ALL                        | 5987                 | 5108                           | 85                      | 84  | 86 | 89  | 8540                                     | 8770 | 9110 |

<sup>a</sup>The estimates given here are for January 1, though in the rest of this monograph they are for mid-1974 and mid-1984. Adjustment is made by adding 50 percent of the assumed new licentiates for 1974 (and 1984), and rounding the final result to the nearest 100.

<sup>b</sup>Of the 5108 physicians presumed active at the beginning of 1964 (excluding 1964 licentiates), 366 did not provide sufficient information to allow grouping by cohort. They were added pro-rata to the 4742 physicians for whom information was complete.

<sup>c</sup>The youngest physicians of this cohort will be 79 years old in 1974 and hence it is eliminated from the projections.

<sup>d</sup>Based on assumptions outlined in Chapter 2.

## Chapter 2

### PHYSICIANS

#### Current Supply

The introduction described the evolution of health services and how they are now organized and distributed. This chapter examines the characteristics of the supply of physicians available to provide these services and, on the basis of recent trends, makes supply projections for the future. First, however, a brief review of the changes that have affected the medical profession during the past several decades can help place the events of today in better perspective.

In the 1940's two parallel events initiated a series of changes whose influence on the practice of medicine still continue. The demand for and supply of physicians, in response to different pressures, increased enormously over the following decade. Looking at demand, completion of the Workers' Social Insurance Fund hospital system in the mid-1940's meant that for the first time a substantial number of physicians entered into government service. The Ministry of Health, in part as a result of the Inter-American "Servicio" program, started a program of expansion following the Second World War which was not to reach full momentum until the 1960's. In 1948 the Employees' Fund gave new purchasing power for health services to yet

another segment of the Peruvian population and the demand for care in the private sector was strengthened. Ten years later, when the huge Employees' Hospital was opened in Lima, the struggle between private and government medicine was fully joined. While a compromise solution was agreed upon, the balance first tipped conclusively in the favor of the public sector.

Events taking place at the University of San Marcos Faculty of Medicine both facilitated and stimulated the growth of government medicine. In response to student pressure, admission requirements in the latter 1940's were relaxed, enrollments skyrocketed, and within less than a decade the number of physicians graduating annually increased six-fold. By the 1950's, competition among doctors located in the capital and major cities was severe. Soon a substantial number of younger physicians began to set up practice in the provincial towns and cities, and the amount of care received by these populations notably increased.

In 1956 control was again imposed over admissions to San Marcos, but the accelerated output of doctors continued. By the time enrollment at San Marcos had decreased sufficiently to affect the annual output of physicians, the new medical schools opened in 1958 in Arequipa and Trujillo, and in 1962 in Lima, began to produce graduates of their own.

Physician output promises to increase even more in the future. Two more medical schools were opened in 1963 in Ica and Cajamarca and in 1966 the Congress voted the funds to create a third school in Lima, bringing the total number of schools up to seven. Of necessity, one

of the principal issues with which the manpower study became concerned is the possible effect this increasing physician output may have on the future development of the health sector.

The paths a young medical graduate may follow in developing his professional career are varied, though several patterns predominate. After internship, almost half of the graduates seek employment in the provinces where competition is less than in the capital and the chances of a steady income during the first few years are better. Close to 10 percent leave the country for advanced study abroad, primarily in the United States, and according to recent information, a substantial number decide not to return to Peru.

Those who prefer to remain in Lima or other large cities often face a prolonged period of economic privation. The majority seek government positions in order to obtain a measure of economic security during the period they are developing their private practice. The positions are limited, however, and many cannot find employment. As a result, a large number end up working without pay in a charity hospital, hoping thereby to attract a few paying patients for the afternoon office hours. A young doctor working thus can also hope that by faithfully assisting the chief of service, he may eventually be named to one of the salaried positions.

Regardless of the way in which the career is started, the eventual pattern of practice is remarkably similar for the great majority of Peru's physicians: government service until noon or shortly there-

after to provide a dependable source of income, and solo private practice in the afternoon and evening. Despite the growing importance of the public sector, it seems likely that most physicians will continue this dual involvement in public and private practice for some years to come.

The Census of Physicians. A total of 5235 physicians were estimated to be professionally active in mid-1964. Information was complete or almost complete for 97 percent of this number and limited to name, sex, and location for 3 percent (160). The median age of active physicians was 37 years. Of those older than the median, 2.8 percent were female; and of those younger, 6.2 percent. Female physicians represented 4.7 percent of the total. Eleven percent of all active physicians received their medical training abroad.

By comparing the number licensed over a suitable period of time with the approximate number of known status who correspond to the same cohort, the maximum limit of census omission can be established. The figures shown below make this comparison for those licensed from 1924 to 1963 (i.e., excluding the incomplete cohort of 1964 licentiates and those licensed prior to 1924).

Physicians licensed in the period 1924-63

(68 years or younger in 1964)

|   |            |
|---|------------|
| Number licensed                         | 5804       |
| Active in Peru in 1964                  | 5049       |
| Known to be inactive in Peru<br>in 1964 | - 31       |
| In the United States <sup>a</sup>       | - 250      |
| In Chile <sup>b</sup>                   | - 26       |
| Estimated deaths prior to 1964          | - 294      |
| Status unknown                          | 144 (2.5%) |

In summary, less than three percent of those presumably alive and under 69 years of age in 1964 could have been professionally active. Since the omission was so small, no corrections were made in analyzing census data.

Comparison of the number licensed in each decade with the number found active at the time of census shows that the phenomenon of emigration is a recent one (Table 2-1).

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<sup>a</sup>According to American Medical Association files there were 256 Peruvian-trained physicians in the United States in March 1965. It is assumed that about 250 correspond to the 1924-63 cohort of licentiates. Of the total of 256, 91 were fully licensed in one or more states and presumably were permanent residents. The remaining 165 physicians were in graduate training and at least some of these will eventually return to Peru. Acknowledgement is gratefully given to Dr. Donald Ferguson of the Johns Hopkins School of Hygiene, and the A.M.A. for making this information available.

<sup>b</sup>Obtained by special request from Chile's Colegio Medico.

Table 2-1. PERCENTAGE OF PHYSICIANS REMAINING ACTIVE: by Sex and Decade of Licensure: Peru, 1964

| DECADE OF LICENSURE | % OF LICENTIATES ACTIVE IN 1964 |        |      |
|---------------------|---------------------------------|--------|------|
|                     | Male                            | Female | Both |
| ALL                 | 85                              | 82     | 85   |
| 1914-23             | 31                              | 0      | 31   |
| 1924-33             | 61                              | 25     | 61   |
| 1934-43             | 96                              | 87     | 96   |
| 1944-53             | 92                              | 88     | 92   |
| 1954-63             | 87                              | 80     | 87   |

The low retention rate of physicians licensed prior to 1924 is expected. However, the drop in the youngest two cohorts, particularly those licensed from 1954 to 1963, was not anticipated and likely reflects the recent overexpansion in physician supply. The somewhat lower retention rate for young women doctors is likely due to the demands of childrearing and appears only transitory. The attrition rates given for women prior to 1944 are not statistically significant due to the small numbers involved.

Geographic Distribution. The marked concentration of physicians in the urban areas is evident in Table 2-2.

Table 2-2. NUMBER OF ACTIVE PHYSICIANS AND POPULATION-PHYSICIAN RATIOS: by Population Group: Peru, 1964

| ITEM                  | POPULATION GROUP |             |                |               |               |              |
|-----------------------|------------------|-------------|----------------|---------------|---------------|--------------|
|                       | Peru             | Metro. Lima | 50,000-249,999 | 25,000-49,999 | 10,000-24,999 | Under 10,000 |
| Active physicians     | 5235             | 3420        | 759            | 184           | 474           | 398          |
| Persons per physician | 2200             | 600         | 1200           | 1600          | 2000          | 17600        |

With 66 percent of the total population living in communities of less than 10,000 inhabitants, most Peruvians clearly lack ready access to medical care.

There is a definite association between physician age and location, with two out of five young medical graduates (since 1950) located in the provinces as compared with only one out of four for those graduated prior to that year.

The departmental population-physician ratio varied from one doctor per 26,500 inhabitants in Huancavelica to one per 700 in Lima (Appendix E). In five departments the ratio was worse than one per 15,000 and in only three was it better than the national average of one per 2200. Comparison with the ratios calculated in 1957 reveals a slight deterioration in the departments of Loreto, Tacna, Tumbes and Madre de Dios, and an improvement in the remaining 20 departments, particularly in the sparsely populated Andean and Amazon regions.

Characteristics of Employment. Despite the great interest of organized medicine in preserving private practice, one of the most notable findings of the census is the high proportion of physicians in salaried employment. Even assuming that all those of unknown status were exclusively in private practice, data presented in Table 2-3 indicate that about nine physicians in ten has a paid job. There has been little change in the percentage of physicians with salaried positions in service institutions since the 1957 doctor census: 81 percent in 1957 and 84 percent in 1964.

**Table 2-3. DISTRIBUTION OF ACTIVE PHYSICIANS BY EMPLOYMENT  
CATEGORY: Peru, 1964**

| <b>EMPLOYMENT<br/>CATEGORY</b>       | <b>% OF PHYSICIANS IN CATEGORY<br/>(N=5235)</b> |
|--------------------------------------|---|
| Salaried job only                    | 28.6  |
| Self-employed only                   | 3.7   |
| Teaching only                        | 3.3   |
| Salaried job and teaching            | 4.5   |
| Self-employed and teaching           | 1.9   |
| Salaried and self-employed           | 34.3  |
| Salaried, teaching and self-employed | 14.3  |
| Unknown <sup>a</sup>                 | 9.4   |

<sup>a</sup>Information was totally lacking on the activities of about 3% of the physicians and partially lacking on the remainder..

Among respondents about 68 percent of all physician time was spent in salaried employment, 26 percent in private practice and 6 percent in teaching. The actual proportion spent in private practice may be somewhat higher. Approximately nine percent of the doctors did not report the number of hours worked in any activity and since most of the non-respondents were in private practice, this category is probably underestimated.

Analysis of the urban-rural gradient shows remarkably little difference in the time worked in each activity according to the size of the urban population. The exceptions are communities with less than 10,000 urban residents where physicians spend relatively less of their time in private practice (20%) and teaching (2%) and more in salaried positions (78%) than those working in larger towns and cities (26, 9, and 65%, respectively).

Comparison of 1957 and 1964 data on the distribution of physicians among the several health care systems reflects current trends in the provision of medical care. During this period the Ministry of Health and the Employees' Fund increased their proportionate share of all employed physicians by about five percent each. The proportion employed in charity hospitals declined by seven percent, the armed and police forces, two percent, and "other institutions", two percent. The distribution and average hours worked are shown in Table 2-4.

Table 2-4. DISTRIBUTION OF SALARIED PHYSICIANS AND AVERAGE HOURS WORKED PER WEEK: by Employer: Peru, 1964

| EMPLOYER             | % OF PHYSICIANS<br>(N=4281) | HOURS WORKED<br>PER WEEK |
|----------------------|-----------------------------|--------------------------|
| ALL                  | 100.0                       | 33                       |
| Ministry of Health   | 35.9                        | 33                       |
| Employees' Insurance | 11.2                        | 33                       |
| Workers' Insurance   | 14.2                        | 36                       |
| Armed & Police       | 14.6                        | 34                       |
| Charity              | 15.0                        | 29                       |
| Other government     | 2.9                         | 26                       |
| Private institutions | 6.2                         | 36                       |

The distribution of medical manpower among the systems of health care has little meaning alone; the number of physicians employed by each one must be related to what is required of them. Comparable information does not exist, however, about either the population served by each system or the number of services provided. An alternative index, useful for purposes of comparison, is the number of physician-hours available per hospital bed. In general terms, the assumption can be made that a system with relatively more physician time available can render both a higher quality of patient care and more effectively utilize its beds than a system with a less favorable ratio. These estimates, based on the number of hours worked per week by hospital-based doctors employed in each health system, are given in Table 2-5.

Table 2-5. DOCTOR-HOURS PER BED-WEEK: by System of Health Care: Peru, 1964

| SYSTEM                         | DOCTOR-HOURS PER BED-WEEK |
|--------------------------------|---------------------------|
| ALL                            | 3.4                       |
| Employees' Insurance           | 12.0                      |
| Workers' Insurance             | 7.6                       |
| Armed and Police               | 6.7                       |
| Ministry of Health             | 2.7                       |
| Private hospitals <sup>a</sup> | 2.5                       |
| Charity hospitals              | 2.0                       |

<sup>a</sup>Actually higher because of private non-salaried practitioners.

These figures should be interpreted with caution since the several systems differ substantially as to their bed occupancy rate, types of illnesses treated, and physician time in outpatient clinics. Nevertheless, the very existence of such wide variation raises the question of what should be considered a reasonable standard for hospital services in the future. This will be considered in Part II, The Demand for Health Manpower.

At the time of the census medical specialization was still rudimentary and largely self-defined. The only organized residency was a two- to three-year program in oncology offered by the Institute for Neoplastic Diseases in Lima. No system for the certification of specialists had yet been established and few specialty associations were in operation. In most cases the designation "specialist" meant that a physician had spent some time in one of the various specialties and tended to at least partially restrict his practice. Of the

remainder, most had either taken a correspondence course or had attended a short lecture series at one of the numerous "institutes" in Argentina, Brazil, and other Latin American countries. Only a few could claim full residency training in Europe or the United States.

Even bearing in mind that the designation "specialist" is self-defined, it is nevertheless interesting to note the recent trend towards specialization as shown in Table 2-6.

Table 2-6. PERCENTAGE DISTRIBUTION OF MEDICAL SPECIALTIES IN 1964 AND 1964/1957 SPECIALIST RATIOS: Peru

| SPECIALTY CATEGORY                    | % IN CATEGORY<br>IN 1964<br>(N=5235) | RATIO, 1964<br>TO 1957 <sup>a</sup> |
|---------------------------------------|--------------------------------------|-------------------------------------|
| ALL                                   | 100.0                                | 1.4                                 |
| General medicine                      | 27.4                                 | 0.6                                 |
| General surgery                       | 10.5                                 | 1.5                                 |
| Pediatrics                            | 8.5                                  | 3.1                                 |
| Obstetrics & gynecology               | 7.6                                  | 3.8                                 |
| Public Health                         | 4.3                                  | 16.0                                |
| Internal Medicine                     | 4.5                                  | -                                   |
| Psychiatry & neurology                | 3.0                                  | 3.0                                 |
| Tuberculosis                          | 3.8                                  | 4.6                                 |
| Physical medicine &<br>rehabilitation | 0.4                                  | -                                   |
| Other medical specialties             | 6.1                                  | 3.5                                 |
| Otolaryngology                        | 1.6                                  | 1.7                                 |
| Anesthesiology                        | 1.6                                  | 10.5                                |
| Other surgical specialties            | 5.5                                  | -                                   |
| Clinical laboratory &<br>pathology    | 3.7                                  | 2.0                                 |
| Other specialties                     | 5.9                                  | 3.1                                 |
| Not indicated                         | 5.6                                  | -                                   |

<sup>a</sup>A dash (-) indicates lack of a comparable category in 1957.

In 1957 the proportion of physicians listing one or more specialties (excluding general practice) was 32 percent, while in 1964 it was 73 percent. Though differences in census techniques and interpretation may account for some of this increase, they can explain only a small part of a phenomenon that is evident throughout Peru. During the seven-year interval many hospitals reorganized their medical staffs into departments, which in turn led to the creation of a variety of specialized clinic and hospital services. As the high output of new physicians during this period became translated into increased competition for patients, a growing number of graduates looked to specialization as the easiest way to qualify for the limited number of government positions. In addition, the tremendous need for public health physicians led the Ministry of Health, in cooperation with the bilateral and multilateral technical assistance programs, to give high priority to overseas fellowship training.<sup>a</sup> Public health thus became the most rapidly growing specialty and by 1964 was the only one in which half of the doctors so classified were working outside of Lima and Callao.

The significance of the apparent trend towards specialization on

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<sup>a</sup>During the period 1954-62 the Pan American Health Organization awarded 60 training fellowships to physicians in public health and in the period 1952-63, the United States government, through its foreign assistance program, gave 48 fellowships in public health and 13 in hospital administration. Fellowships from other sources brought the total to approximately 148 doctors trained in public health and 20 in hospital administration. An additional 102 doctors received study fellowships from PAHO and AID for training outside of Peru in various clinical specialties.

the quality of medical care is unclear. Good specialty training is unquestionably necessary for most physicians working in a large hospital or teaching in a medical school. For most of Peru's health problems, however, specialization can contribute little and may indeed make it more difficult to provide those services most needed. It will be difficult for Peru's medical schools to develop residency programs without at the same time accelerating the trend towards specialization. One solution, already applied with success in some countries, is to require applicants for a government-sponsored residency program to have previously completed a minimum number of years of general medical service outside of the capital city. Almost one in every four (24%) of Peru's doctors reported having a teaching appointment in 1964. Of the 1257 physicians identified, 955 (76.0%) were in medical schools, 771 (6.1%) in other health-related schools, and 255 (17.9%) in educational institutions not related to the health sciences. The comparatively high proportion of those not teaching the health sciences who were located outside of Lima (50% as compared with only 13% in the health sciences) suggests that many provincial doctors find it advantageous to supplement their income by teaching in the local school or university.

The equilibrium which exists between health professionals working in the private and public sectors is a dynamic one, the balance at any

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Comparison with medical school records showed that about 200 physicians, most of them with part-time appointments, failed to note their academic position.

particular given time reflecting the relative attractiveness of job opportunities in private practice as compared with government employ. For this reason, knowledge of what is happening in the private sector can be very useful in shaping future government policies. Since income is likely the single most important determinant of the sector in which the physician chooses to work, the Planning Office decided to develop income estimates for physicians working in each of the main types of work situations.

The possibility of asking a sample of physicians to indicate their income was promptly rejected as not feasible. If respondent anonymity were preserved, there would be no chance for followup of the many who did not reply to the first mailing. If, on the other hand, the physician had to reveal his identity, answers would likely be inaccurate or refused. It was therefore decided to construct seven different models of a typical physician's practice, using information obtained by indirect methods as the basis for income estimations. These models deal separately with physicians working in metropolitan Lima and in the rest of the country. Within these two locations, doctors were divided into those working entirely in the public sector, entirely in the private sector, and in both. The doctors in private practice in Lima were again separated into those in general practice and those practicing as full-time specialists.

For physicians in public employ, different income assumptions were made for full-time and part-time practitioners. In the private sector, estimates were made of the hours worked weekly, patients seen per hour, fee charged per patient, weeks worked per year, and the

proportion of total physician income derived from services rendered outside the physician's office (e.g., from hospitalized patients, house calls, etc.) The methods used for making these estimates are outlined in Appendix F and the basis for each assumption is given.

Table 2-7 summarizes the estimated gross income for physicians in each of the seven job situations.

Table 2-7. ESTIMATED GROSS MONTHLY INCOME FOR PHYSICIANS, BY TYPE OF WORK SITUATION AND LOCATION: Peru, 1964<sup>a</sup>

| LOCATION AND WORK SITUATION                  | MONTHLY INCOME FROM |                  | TOTAL      |       |
|--|---------------------|------------------|------------|-------|
|  | Salaried position   | Private practice | Soles      | US \$ |
| <b>Metropolitan Lima</b>                     |                     |                  |            |       |
| Salaried position only                       | S/. 12,000          | -                | S/. 12,000 | \$448 |
| Private general practice only                | -                   | S/. 12,200       | 12,200     | 455   |
| Private specialty practice only              | -                   | 20,600           | 20,600     | 769   |
| Salaried position & private general practice | 10,300              | 6,700            | 17,000     | 634   |
| <b>Rest of Peru</b>                          |                     |                  |            |       |
| Salaried position only                       | 10,000              | -                | 10,000     | 373   |
| Private general practice only                | -                   | 14,300           | 14,300     | 534   |
| Salaried position & private general practice | 8,400               | 8,200            | 16,600     | 619   |

<sup>a</sup> Based on methodology outlined in Appendix F.

It must be emphasized that these figures represent only a rough approximation of a doctor's income, an elusive statistic in any culture. As averages, these estimates encompass a wide range of

incomes and many young doctors, facing the hardships of their first year in practice, will probably view them with incredulity. Since the estimates do not take into account either the deductions required by law from the pay of salaried employees or the bad debts or overhead expenses of private physicians, the actual "take-home" pay is likely to be substantially (10-20%) lower.

By weighting each income estimate according to the approximate number of physicians in the category, a mean gross monthly income of 14,500 soles per month is obtained. Income earned from teaching appointments would add almost 1000 soles (60 million soles earned annually divided among 5235 doctors). Rounding to the nearest thousand gives a mean gross monthly income for Peruvian physicians of 15,000 soles (\$560).

What significance do the income estimates for the several work categories have? From the government's point of view, the most important conclusion is that the private sector is already somewhat overcrowded and hence most of any net improvement in the physician supply will accrue to the benefit of the public sector. This conclusion can be derived from a series of observations and deductions:

- (1) Income estimates for doctors working in the public sector are relatively accurate, particularly for those in full-time positions, since information is based on government salary scales.
- (2) Government agencies periodically conduct "competitions" to fill vacancies for physicians. In recent years the number of applicants for positions in Lima has greatly

exceeded the number of vacancies. This suggests that the net amount earned by the physician in private practice is not much more than what he could earn in a government job, and may be considerably less in some situations (e.g., recent graduates, general practitioners). If this is the case, the private practice income estimates, at least for Lima, do not appear unreasonable.

- (3) The most critical assumptions for estimating income from private practice are: the hours worked per week and fee charged per consultation. The fee assumption (S/. 50 for a general practitioner in Lima) is probably quite reliable. The other two assumptions (i.e., 23 hours per week for full-time private practice and 2.2 patients seen per hour by Lima generalists) appear so low as to suggest either under-reporting or inefficient utilization of physician time. If these latter two assumptions are adjusted to correct for hypothesized under-reporting, the revised estimate for income from private practice appears unreasonably high, both in the light of common knowledge and salary levels available in government positions. For example, if a general practitioner charged S/. 50 per visit, worked in his office 34 hours a week, and saw 4 patients per hour -- seemingly reasonable estimates -- he would then average S/. 28,300 (US \$1,055) per month, excluding income gained

from house calls and hospitalized patients. It is therefore inferred that the original assumptions regarding the number of patients seen per hour and the hours worked are probably not far from the truth.

Following this reasoning, the private practitioner has a practice characterized by low productivity and high patient cost. If the average fee were lowered, presumably more patients would utilize the private sector, the number of patients per hour and hours per week would rise, but income would remain approximately the same. The net effect of the productivity and cost factors for the private sector is to maintain income at a level roughly comparable to what is earned in the public sector.

Looking to the future, two alternative situations can be postulated: (1) approximate maintenance of the 1964 physician-population ratio (1:2200), or (2) substantial improvement of this ratio. In the first situation the private sector would gradually expand and absorb an increasing proportion of the annual output of physicians, making it progressively more difficult for the public sector to obtain enough physicians for the provinces. In 1964 the number of doctor vacancies outside of Lima was estimated at more than 300.

If, however, the ratio improves, the government would get most of the increment. Otherwise, the influx of new doctors into the private sector would force income from private practice to below government salary levels and in turn cause many to seek government employment.

In fact, it is projected that the physician-population ratio will improve from the 1964 value of 1:2200 to at least 1:1800 by 1974. While generally encouraging for the public sector, this rapid improvement in the physician-population ratio may create problems of adjustment. Using the 1620 full-time equivalent physicians in private practice in 1964 as a starting point, and making the assumption that the private sector absorbs an annual physician increase of 4.8 per cent (approximately equal to the growth rate of big cities), this sector will then have about 970 additional full-time equivalent physicians in 1974. When this number is subtracted from the projected 1964-74 physician increment of 3500 physicians, the equivalent of over 2500 additional full-time physicians are left to be absorbed by the public sector during the ten-year period. Salaries alone for these additional physicians in government service (assumed monthly income in 1964 was S/. 11,000) would amount to over S/. 350 million in 1974. The provision of facilities, paramedical and auxiliary personnel to make effective use of these physicians would increase the cost even more.

It is clear that Peru could benefit from many more doctors. The questions are whether they can be paid for and effectively put to work. If adequate provision for the absorption of these physicians is not made in time, serious problems may arise. Medical associations may put increasing pressure on the public sector health systems to create jobs to relieve physician "under-employment". This could lead to the "taxi-doctor" pattern of the 1950's in which each doctor spent an inordinate amount of time travelling between a number of short-time and poorly paid jobs.

Another possibility is migration to other countries. This is already happening in Turkey and the Philippines where the private sectors are overcrowded and the public sectors unable to absorb the many doctors that graduate annually. Peru might then find a substantial proportion of its large investment in medical education permanently lost to the country. The chapter on future demand attempts to project the capacity of government health programs to absorb new physicians in the coming decades.

#### Medical Education

The Faculty of Medicine of the University of San Marcos is one of the historic educational institutions of the hemisphere. Officially incorporated as a Faculty in 1856, medical education actually dates back more than three centuries to the creation of two professorships in 1635. The evolution of medical education in Peru up until the 1930's has been ably described by Lastres in his study of the history of Peruvian medicine. (20)

From 1637, when the first Peruvian-trained doctor was graduated, until the 1940's, enrollment in medical studies was small and often irregular. Instruction was based on the four pillars of lectures, demonstrations, reading and examinations, and although the curriculum and administrative policies were subject to occasional reform, changes were seldom radical.

Since then, however, there have been major alterations in both the quantitative and qualitative aspects of Peruvian medical education. The first changes affected quantity. From 1945 to 1951 enrollment at

the San Marcos Faculty of Medicine jumped from 1156 to 2949. Medical students, formerly representing about 18 percent of the entire University enrollment, now accounted for 30 percent. The effect of this change on the distribution and sponsorship of health care has already been described.

The quality of graduate produced during this period was probably not very different from preceding years since instruction was based on pedagogical methods not readily affected by large classes. However, this type of medical education was gradually becoming less acceptable. The growing complexity of the health sciences demanded that students have more opportunity to deepen their knowledge and skills through supervised practical experience. In Peru it became evident that these new educational techniques could not be effectively applied to the large classes at San Marcos.

The drive to improve the quality of medical education led to a number of important changes whose long-range consequences were to be equally important as those affecting quantity. In 1956 medical school authorities succeeded in restoring control over admissions (now set at 150 in the first year of medicine). In 1960 a study commission presented its recommendations for major reforms in the curriculum at San Marcos. (21) Although the duration of medical studies was to be reduced from nine years to eight (two years of pre-medical studies, five years of medicine and one year of internship), the number of teaching hours was to be increased by 25 percent. New courses were to be added in the behavioral sciences, rehabilitation and nutrition, and instruction in the major clinical subjects and preventive medicine.

strengthened. Unfortunately, before most of these changes could be implemented, the medical school at San Marcos became involved in a crisis of major proportions.

In July 1961 the medical students and faculty clashed over the policy of "co-government" (co-gobierno). The University as a whole had already acceded to student demands to have a third voice and vote (the faculty and administration having the other two-thirds) in the formulation of policy, but the Faculty of Medicine refused to comply. The professors declared they would rather resign than allow students to participate in decisions which they considered highly technical and beyond student competence. Despite this threat, the government finally bowed to student demands and imposed co-government on the medical school. Within days 423 professors left their posts, leaving behind only a small minority. Classes were suspended and many students transferred to foreign institutions. The entire medical community of Lima felt the impact of this crisis, and only several years later did the animosities thus generated lose their ardor.

The ultimate result of this crisis was foreseen by few. The dissident professors decided to create a private medical school which would also offer training in the biological sciences. Thus the Peruvian University of Medical and Biological Sciences (Universidad Peruana de Ciencias Medicas y Biologicas, Facultad de Medicina "Cayetano Heredia") was formed in 1962 and named after Cayetano Heredia, the first dean of the San Marcos Faculty of Medicine. Many students from San Marcos transferred to the new school so that in the first year of operation students were enrolled in all years of medical studies. The

entering class for medical studies was set at '60 and by 1966 had risen to 70.

The new school hoped to use its autonomy to develop a teaching program built on the principles of modern medical education. Much of the new curriculum developed in 1960 was incorporated into the new school. However, the cost of such education is high and the sources of large and permanent private support in Peru were limited. Public financing of the new medical school became increasingly acceptable following the changes in government of 1962 and 1963, and by 1965, more than half of the budget came from this source.

As surprising as the creation of Cayetano Heredia was the survival of the medical school at San Marcos. In the years prior to the crisis many Lima specialists had attempted in vain to obtain appointment to an academic position. When the crisis erupted in 1961, the "outs" saw their chance. Within a few months most of the teaching positions were filled and by 1962 San Marcos was again in full operation.

Although the policy of co-government was preserved at San Marcos, student interference in educational policies decreased substantially. Student leaders were now aware that large enrollments would prejudice the quality of their own education and a return to the open admissions policy of the previous decade was no longer advocated. During the next several years San Marcos adopted many of the more important elements of the curriculum reform proposed in 1960 and the number of full- and half-time faculty increased annually. Both Lima schools developed programs of postgraduate medical education

and in 1964 started residencies in the major clinical specialties similar to those in the United States.

Quite independently of the events taking place in Lima, a number of medical schools were established in provincial universities. In 1958, schools with an intake of 60 students each were opened in Arequipa and Trujillo, their curricula being similar in most essential respects to the one used at San Marcos. Two more schools were opened in 1963, one in the coastal city of Ica and the second in the small sierra community of Cajamarca. Ica, with an intake of 40, followed the example of the established medical schools and adopted the standard eight-year study program.

In contrast, the School of Rural Medicine at Cajamarca designed a curriculum aimed at dealing with the particular health problems of the Andean region. One year less in duration, the Cajamarca program called for special emphasis in sociology, anthropology, Indian languages, and those aspects of medicine and public health of special importance to isolated and relatively primitive populations. Graduates of the school were to practice for a minimum of five years in a community of less than 2000 inhabitants, after which they would be free to practice in the locality of their choice. Despite a very limited budget and lack of teaching personnel, the school at Cajamarca admitted students to pre-medical studies in 1963.

The other five schools were immediately concerned about the possible effect of Cajamarca on the quality of medical education. In 1964 they formed the Association of Peruvian Faculties of Medicine (Asociación Peruana de Facultades de Medicina) and the first meeting

was devoted to drafting minimum requirements for establishing a medical school in Peru. The viewpoints of both Cajamarca and the other medical schools were easy to understand. Cajamarca, and indeed the whole sierra, needed physicians with an orientation appropriate to populations with a low level of technical consciousness and primitive sanitary conditions. The remaining medical schools and the Ministry of Health were concerned lest Peru create more schools than could be supplied with adequate teaching personnel and other resources. Furthermore, they sought to avoid the problems that would arise due to the shorter curriculum offered at Cajamarca as compared with the other schools.

Discussions concerning the school at Cajamarca were carried on in muted tones. Since each university was virtually autonomous in determining the degrees to be offered as well as the educational prerequisites for obtaining them, only the national Congress -- with its power to withhold funds -- could impose a decision on Cajamarca, and such a measure was highly unlikely. Finally, in early 1965, authorities at Cajamarca agreed to adopt the same basic curriculum used by the other schools. In return, the school was allowed to join the Association of Peruvian Faculties of Medicine, and the two Lima medical schools promised to loan certain key teaching personnel until such time as Cajamarca could continue on alone. Since Cajamarca only had pre-medical students enrolled when the 1964 medical school study was conducted, data on its characteristics are excluded unless otherwise indicated.

With the opening of the schools at Ica and Cajamarca, medical educators hoped they would no longer have to contend with the desire of legislators and local medical societies to create new institutions. This hope was short-lived and indeed the final projections of physician supply had to be adjusted to include a seventh Faculty of Medicine created in 1966 at the University of Federico Villareal (Lima). Largely the result of political considerations, the new school promises to further fractionate scarce teaching resources and to increase the danger that a physician surplus will develop in the future.

Even more schools are under consideration. By the end of 1966 pressures were increasing to establish new schools in the port city of Callao and even in the small towns of Huacho (20,000) and Tarapoto (10,000+). Unless this proliferation of new medical schools can be stopped and perhaps even reversed through the consolidation of several of the more marginal institutions, the gains of recent years may well be lost. This issue, without doubt one of the most important problems now facing leaders of the medical profession in Peru, will be considered in Part III.

Medical School Applicants. The ratio of applicants examined for entrance to those accepted for pre-medical studies is given below for the period 1960-64.

| YEAR                      | 1960 | 1961 | 1962 | 1963 | 1964 |
|---------------------------|------|------|------|------|------|
| APPLICANTS<br>PER ENTRANT | 4.8  | 4.4  | 5.6  | 4.7  | 7.3  |

Despite the additional annual intake of 60 at Federico Villareal it is expected that at least a 5:1 ratio will be maintained over the next few years. This ratio is considerably above that found at any other category of professional school and theoretically, at least, should afford the medical schools the opportunity to be highly selective of those accepted.

In fact, the situation is not so favorable. In 1964 the Faculty of Science of the parent university was responsible for the selection of applicants for the first year of pre-medical studies at all schools except Cayetano Heredia. Several medical schools did not participate in the selection, even in an advisory capacity. According to interviews with medical school authorities, the lack of medical school control over admissions to the two-year pre-medical program has frequently meant that more students were admitted than could be accepted by the medical school two years later, and also that the criteria used for selection were not always the most appropriate for those embarking on a career in medicine.

A more appropriate measure of the availability of applicants is the ratio of those considered "qualified" by medical authorities to undertake medical training, to the capacity of the entering class at the medical schools. In 1963 there were an estimated 700 qualified applicants per space. There was considerable variation among the schools, the individual ratios being 1.0, 1.7, 1.8, 2.1, and 2.5.

Projecting these findings to 1967, it is estimated that about 3000 students will apply for a medical education. Of these, almost 800 will meet the minimal academic requirements for admission and

approximately 460 will be admitted.

Repetition of Studies and Dropouts. By repetition rate is understood the percentage of students that are repeating a year of studies. Estimation of this rate is useful for several reasons. If the rate is high and changing, a correction factor must be applied to project school output since student progress through the study curriculum is retarded. The repetition rate can also provide indirect evidence on the quality of both the students and their school, since poor students, poor study supervision, or both will tend to increase the proportion repeating their studies. Furthermore, a high rate serves as an alarm for action -- calling attention to the wasted time and resources being spent by students and school.

In 1955 the repetition rate at San Marcos was 5.6 percent and in 1960, 5.5 percent. During the two-year period 1963-64 it averaged 5.4 percent of all of Peru's schools. As expected, the first two years of study are repeated most often. In 1963-64, 83 percent of all repeating students were in these years and the repetition rate was 10.1 percent. Substantial variation in the overall rate was noted between the different schools, but in no school did it exceed 10 percent.

Since the average repetition rate is both relatively low and apparently unchanging, no correction is made for this factor in physician output projections.

Students permanently abandoning their studies reflect a social and economic loss to both school and student. Calculation of the "dropout rate" can help pinpoint this important problem as well as

improve projection of future output. In the present study, it proved impracticable to determine the exact number of students leaving each year, the cause for leaving (health, economic problems, poor academic performance, etc.) or the years of study completed. Instead, the dropout rate was estimated by a comparison of the number of entrants with the number that graduated after the requisite number of years.

Information obtained from the three medical schools with at least six years of operation in 1964 indicated that in the late 1950's and early 1960's approximately nine percent of the students enrolled did not complete their studies (individual rates were 12, 4, and 21 percent). Though this average should warrant some concern, it is a marked improvement from the 32 percent dropout rate at San Marcos between 1948 and 1958 -- the period when admissions were not restricted. The projection of the output of physicians is based on the assumption that the dropout rate of nine percent will continue. Indeed, the teacher shortage and the marginal qualifications of many students would probably make it difficult to substantially lower this rate in the immediate future.

Teaching Personnel. The new medical schools and the shift towards greater use of salaried full- and half-time faculty in preference to part-time personnel have greatly increased the demand for qualified medical educators in Peru. The lack of sufficient teachers to meet this need represents one of the major problems faced today by those responsible for directing medical education in the country.

The changes that have occurred in faculty staffing can be appreciated by comparing the 1950-57 ratio of 3.1 medical students per

professor to the 1963-64<sup>a</sup> ratio of only 1.6-to-one. Even more significant than this 97 percent improvement in the student-faculty ratio has been the increase in the number of faculty-hours available per student. Based on the assumption that the average professor at San Marcos in the 1950's devoted about ten hours per week to his teaching position, theoretically there were about three faculty-hours available per student-week. The comparable value for 1963 was approximately eight hours, a 166 percent increase.

Despite such evidence of improvement the gap between needs and reality remains great. In 1963, approximately 25 percent (68 of 268) of the budgeted full- and half-time teaching positions available at the Arequipa and Trujillo medical schools were vacant. In terms of actual teaching time, the situation was even worse: at Arequipa 32 percent of the budgeted time was vacant, and at Trujillo, 30 percent. This problem will be duplicated at Ica and Cajamarca as additional faculty positions are created to provide for the annual increments of students. The small size of these cities will make faculty recruitment -- particularly of specialists and teachers of the basic sciences -- even more difficult than has been the case at Arequipa and Trujillo.

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<sup>a</sup>The medical school survey was conducted prior to April 1964 (when the academic year begins) at all schools except Ica and Cajamarca. Hence, data on faculty at the four established schools apply to 1963. The two new schools were surveyed during the 1964 academic year since previously they only had pre-medical students. Information on applicants was subsequently updated to 1964 at all schools and on enrollments, to 1966.

The importance of developing a long-range plan for the preparation of medical school faculty is evident. However, estimation of future requirements presupposes appropriate standards for medical school staffing. Since such standards have not yet been developed in Peru, an empirical method was used to make a first approximation of future needs. The six medical schools were surveyed to determine the number of faculty employed, the number of budgeted positions vacant, and the number of additional faculty positions desired. All faculty positions, employed, vacant, and desired, were then translated into "full-time equivalent" (F.T.E.) positions in order to avoid problems that might arise due to inter-school differences in the average amount of time worked per instructor. Two faculty-student ratios were then developed, "employed" and "desired". The former expresses the number of employed F.T.E. faculty per ten students and the latter, the number of desired (i.e., occupied + vacant + additional desired teaching positions) F.T.E. faculty per ten students, assuming full programmed enrollment. In 1963, the ratios calculated for the four schools with completed enrollments are given in Table 2-8.

Table 2-8. FULL-TIME EQUIVALENT FACULTY EMPLOYED AND DESIRED PER TEN STUDENTS: by Medical School: Peru, 1963

| MEDICAL SCHOOL   | F.T.E. FACULTY PER TEN STUDENTS |         |
|------------------|---------------------------------|---------|
|                  | Employed                        | Desired |
| Arequipa         | 2.3                             | 3.8     |
| Cayetano Heredia | 3.1                             | 3.1     |
| San Marcos       | 1.9                             | 1.9     |
| Trujillo         | 2.8                             | 4.0     |

The desired faculty-student ratio at each of these schools was then applied to the estimated enrollment for 1973, the year in which the newest of Peru's schools (Federico Villareal) will have students in all five academic years of medical studies. The average of the ratios observed at Arequipa and Trujillo was used to estimate the requirements for Ica and Cajamarca, and of the two Lima schools for Federico Villareal.

The results obtained by this method of projection are given in Table 2-9 and compared with the situation at the time of survey.

Table 2-9. MEDICAL SCHOOL FACULTY EMPLOYED IN 1963-64 AND PROJECTED REQUIREMENTS FOR 1973: Peru

| ITEM                            | MEDICAL SCHOOL FACULTY |                  |
|---------------------------------|------------------------|------------------|
|                                 | 1963-64                | 1973             |
| Full-time equivalent faculty    | 384                    | 680              |
| F.T.E. faculty provided by      |                        |                  |
| Full-time & half-time personnel | 333                    | 610              |
| Part-time personnel             | 51                     | 70               |
| Persons in                      |                        |                  |
| Full- & half-time positions     | 494                    | 915 <sup>a</sup> |
| Part-time positions             | 668                    | 900 <sup>a</sup> |
| Percent of time contributed by  |                        |                  |
| Full-time & half-time personnel | 87                     | 90               |
| Part-time personnel             | 13                     | 10               |

<sup>a</sup>In 1963-64 about 1.5 full- and half-time faculty equaled (in time) one F.T.E. faculty. This same ratio is used to convert the projected requirement of 680 F.T.E. faculty into 915 full- and half-time personnel. The number of part-time personnel employed at Cayetano Heredia and San Marcos is assumed to remain unchanged and Federico Villareal is expected to add somewhat over 200.

These projections indicate that if all seven schools are to have by 1973 the faculty-student ratios desired in 1963-64, then the total available teaching time will increase about 77 percent and slightly over 400 additional full- and half-time faculty will be required. It should be noted that according to current staffing patterns, about 240 of the additional 400 teachers should be of professorial rank (i.e., full, associate and assistant professor).

In planning to meet these projected requirements, several problem areas can be identified. The shortage of teaching personnel is much more acute in the pre-clinical (basic) sciences than in the clinical fields. Since professorial pay is relatively low (\$/ 12,000 per month --- or US \$448 -- for a full professor at full-time in 1964) and the basic science specialist does not have an opportunity to increase his income through private practice, the incentives are limited. In some schools professors in the basic sciences are paid less (at the same rank) than those in the clinical specialties, thus accentuating the economic discrimination even more. Elimination of salary differentials where they exist and more liberal use of the bonus for "exclusive dedication" (dedicacion exclusiva -- whereby professors without any outside income source receive a substantial bonus in addition to their full-time salary) could contribute substantially to easing the shortage of teachers in the basic sciences during the next several decades.

But a solution that focuses only on the issue of income differentials is not likely to have a very immediate effect on this problem; direct action is necessary to increase the output of basic

science teachers. One alternative warranting serious attention was under discussion at San Marcos in 1964. According to this proposal some of the better medical school applicants, rejected because of lack of space, would be diverted into the Faculty of Sciences. After obtaining a doctorate in the basic sciences, these graduates would then help to meet the need for basic science teachers in all Peruvian universities, including the medical schools.

Another shortage that will be hard to meet is for teachers of preventive medicine. As will be discussed in Part III, this discipline needs to be given much more emphasis than has been the case in the past if the medical schools are to train practitioners suitable for the nation's needs. Teaching competence in preventive medicine should be promoted through the use of travel fellowships, exchange programs, and perhaps by establishing a special regional training program for postgraduate training in medical education analogous to the program in nursing education given at the School of Public Health in Lima.

In past years, appointment to a senior academic position required that prospective candidates have a doctoral degree (beyond the M.D. degree), and in theory at least, this rule was still in effect in 1966. The utility of this requirement is increasingly questioned, and indeed the degree demands only that the candidate complete an acceptable thesis. The need for faculty in coming years makes it unrealistic to consider only those with a doctoral degree for senior academic positions. From 1920 to 1959 only 98 doctorates were awarded, and although the average annual output rose to almost 13 in the 1960-63

period, even this rate would be inadequate to qualify more than a

fraction of the 100-150 additional professors required by the 1970's.

The Association of Peruvian Faculties of Medicine could help clarify

this situation by reviewing the utility of the doctoral requirement

and making recommendations for the future. If the requirement is

to be retained, specific measures will be necessary to increase the

number of doctoral candidates to approximately 20-25 per year.

The Cost of Medical Education. By any standard, the cost of

medical education is high. However, the task of sorting out which

costs should be ascribed to education and which to patient care

makes precise cost accounting difficult, even in countries where

data are relatively abundant. In order to determine the approx-

imate magnitude of the cost of medical education in Peru, and the

rate at which it is changing, educational budgets for operating

expenses only were analyzed for the years 1961, 1963 and 1964.

During the period 1961-64 the cost of a student-year in medical

school increased from S/. 26,300 to S/. 51,200, a 70 percent increase

after correcting for inflation. Though the costs at the different

medical schools varied at times in excess of S/. 20,000, it was not

possible to draw any firm conclusion about the quality of education

each one offered based on cost data alone. Fluctuations in the

number of students enrolled, varying criteria for budget formulation,

differences between programmed budget and actual expenditures, and

other factors made comparative analysis difficult. However, the

existence of such wide differences suggests that the Association of

Peruvian Medical Faculties could help member schools to optimize

utilization of their limited fiscal resources and plan future expenditures by developing model budgets appropriate for the several types and sizes of Peruvian medical schools.

The direct medical school cost of educating a physician in 1964 was approximately S/. 241,000 (\$9000).<sup>a</sup> To this should be added the cost of two years of pre-medical studies, teaching hospital costs related to their role in medical education, and the cost of the internship year. No estimates of these additional costs were available at the time of survey.

The tendencies in costs observed in the period 1961-64 cannot be extrapolated to future years without qualification. The bulk of this increase was due to the conversion of many academic appointments to a salaried basis, and this will probably not continue in the same rate in the future.

An independent basis for projection can be obtained by multiplying the number of professors expected to be employed in a given future year by the estimated cost per professor, this total cost for medical education then being divided by the projected enrollment in order to calculate the student-year cost. If it is assumed that:

- (1) The annual cost per full-time equivalent professor (including all expenses) in 1964 was S/. 228,000 (estimated 87 million soles actual expenditures for the six medical schools divided by 384 employed F.T.E. professors),

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<sup>a</sup>Based on the 1964 student-year cost, and corrected for an assumed 9 percent attrition and a 10 percent overestimate by the schools in the amount to be actually expended.

(2) The total projected 1973 requirement of 680 F.T.E. professors is met,

(3) The cost per professor will increase by approximately 30 percent (assuming a 3% annual real increase in costs),

(4) Total medical school enrollment, excluding interns, will be 2300 in 1973,

then the total direct cost for seven medical schools in 1973 will be about 203 million soles. This represents a student-year cost of S/. 88,000 and a cost per graduate of S/. 455,000 (\$17,000), or 89 percent more than in 1964. These estimates are more likely high than low since the medical schools may well be unable to employ the total number of F.T.E. professors projected for 1973.

Increased enrollment is a far less expensive method of producing an additional physician than the creation of a new medical school. The programmed output of each of the schools except Cajamarca, Ica and San Marcos is currently between 50 and 60 physicians per year. If a decision were made to increase physician output by the equivalent of one medical school of this size, the 60-70 entrants necessary could be absorbed by the seven existing schools at a very small reduction in the 1964 faculty-student ratio. If the same increase in output were achieved by means of a new medical school, approximately 12 million soles annually would be added to the investment in medical education. For this reason, and also because teaching personnel are in short supply, the next increment made in the output of Peruvian medical schools should be accomplished by increasing the enrollment of existing schools rather than opening a new one.

Physical Facilities: By 1969 at least five of the seven medical schools (excluding Cajamarca and Federico Villareal) will have good facilities adequate for their programmed enrollment. Facilities now occupied by the remaining two schools are very inadequate and at the time of survey neither of these schools had plans for construction. Authorities at the five institutions with adequate facilities estimate they could collectively accommodate up to 20 percent more students (i.e., about 90 students more in each year of studies) without seriously prejudicing educational standards.

Future Supply

The projected output of Peru's seven medical schools and the bases for its estimation are summarized below.

| DECADE  | GRADUATES | BASES FOR ESTIMATION  |
|---------|-----------|---|
| 1964-73 | 3640      | Number of graduates in 1964 and 1965; number enrolled, by year of study, in 1966; assumed attrition of nine percent for first-year medical students and a lesser rate for more advanced students. |
| 1974-83 | 4210      | Assumed 15 percent attrition for the 520 first-year pre-medical students enrolled in 1966; assumed intake of 460 first year medical students thereafter and a nine percent attrition.             |

Since it is based on actual enrollments, the output projection for the first decade has a high degree of accuracy. The projection for the second decade is subject to much more uncertainty and probably

reflects a minimum figure, even without the creation of any new medical schools.<sup>b</sup> (INDUSTRIAL)

From 1924 to 1943, over a fifth (22%) of all physicians licensed to practice in Peru received their training abroad. Although foreign graduates as a percentage of the total declined to about eight percent in each of the next two decades, the number of foreign degree validations rose markedly (118 and 277). By 1964 the influx of foreign-trained physicians represented the equivalent output of an additional Peruvian medical school.<sup>a</sup> The Association of Peruvian Medical Faculties, concerned about the marginal qualifications of many of these doctors, plans to review the requirements for degree validation<sup>b</sup> in the near future.

The number of physicians expected to validate foreign degrees in the future can be estimated indirectly, by extrapolation of recent trends, or directly, by obtaining relevant information from foreign medical schools. The wide variation from year to year in the degrees validated makes the direct method preferable.

The direct method poses three questions: (1) How many Peruvians are studying medicine abroad; (2) What proportion will graduate;

(3)

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<sup>a</sup>Before the actual study was initiated, it was estimated that between 1000 and 5000 Peruvians were studying medicine outside of their country. The prospect of having to absorb up to 5000 foreign-trained doctors over a short period of time was -- to say the least -- viewed with some alarm.

<sup>b</sup>Most of the Latin American republics (including Peru) and Spain have treaties of reciprocity whereby each country validates medical degrees conferred in other countries without further examination.

and (3) How many of the graduates will return to Peru to practice. Since the number of foreign-born physicians immigrating to Peru was negligible, this factor was not taken into account. Based on past experience, 35 Latin American and Spanish medical schools likely to have Peruvian medical students were selected for survey. In 1964 a short questionnaire was sent to these schools and after two mailings, a total of 21 replies (60%) were received. The data obtained were used to estimate the validation rate, which was then compared with a simple extrapolation of the rate for the recent past.

Analysis of the data obtained in the survey of foreign medical schools suggests that approximately 750 physicians will validate their degrees in Peru from 1964 to 1973 and this estimate is used in projecting the physician supply to 1974. The relevant information and method of calculation are summarized in Appendix II.

Extrapolation of the number of validations that have occurred in recent years does not afford a firm basis for an extended projection. Nevertheless, the observed average of 51 validations per year during the period 1961-65 gives some support to the projection of 750 (or about 75 per year) for the 1964-73 decade obtained by the direct method of calculation.

Table 2-10 compares the projected physician supply according to alternative rates of retention with the supply in earlier years. According to these projections, the population-physician ratio will improve rapidly during the first decade and more moderately during the second. The effect this improvement will have on health care depends largely on whether physicians can be distributed more

**Table 2-10. SUPPLY OF ACTIVE PHYSICIANS FOR SELECTED YEARS:<sup>a</sup>**  
**by Alternative Hypothesis of Retention: Peru**

| YEAR | NUMBER OF PHYSICIANS  |                         |                                |
|------|-----------------------|-------------------------|--------------------------------|
|      | Present Retention (I) | Improved Retention (II) | Total Potentially Active (III) |
| 1940 | 793                   | 793                     | 1200                           |
| 1957 | 3834                  | 3834                    | 3700                           |
| 1961 | 4413                  | 4413                    | 5000                           |
| 1964 | 5235                  | 5235                    | 5600                           |
| 1974 | 8700                  | 9000                    | 9300                           |
| 1984 | 12400                 | 12900                   | 13300                          |

| YEAR | PERSONS PER PHYSICIAN |                    |                          |
|------|-----------------------|--------------------|--------------------------|
|      | Present Retention     | Improved Retention | Total Potentially Active |
| 1940 | 8400                  | 8400               | 5600                     |
| 1957 | 2400                  | 2400               | 2500                     |
| 1961 | 2300                  | 2300               | 2100                     |
| 1964 | 2200                  | 2200               | 2000                     |
| 1974 | 1800                  | 1700               | 1700                     |
| 1984 | 1700                  | 1600               | 1600                     |

<sup>a</sup>Data for 1940 and 1957 from Encuesta Medica y Hospitalaria en el Peru (ref. 19), Table 4. Data for 1961 from a special tabulation of the 1961 national census.

evenly within the country than was the case in 1964. For example, if metropolitan Lima maintains its 1964 population-physician ratio of 1:600 and grows at only five percent annually (the 1940-61 growth rate was 6.3%), the 1964 ratio of only one physician per 5300 persons in the provinces will improve only to 1:4200 by 1984. Thus, even with a large increment in physician supply, more access to medical care in the provinces will require a substantial redistribution of medical manpower.



### Chapter 3

#### DENTISTS

##### Current Supply

Dentistry is having growing pains. There are too few dentists to meet the need for dental care; there are too many in relation to the demand. Judged by the profession, dental productivity is low by modern standards; few dentists have auxiliary personnel,<sup>a</sup> dental equipment is often lacking or of poor quality, and too much time is spent on palliative dentistry and too little on preventive or restorative care.

The imbalance between supply and demand has come into focus in recent years primarily as a result in the rapid increase in supply. During the fifty-year period, 1904-53, slightly more than 1000 dentists were licensed. By 1963, only ten years later, this number had been more than doubled. Whereas the public sector absorbed a large proportion of the increased output of physicians and nurses, most dentists had to depend on private practice for their livelihood.

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<sup>a</sup>Dental technicians, assistants, and hygienists were originally included among the categories of health personnel to be enumerated. Since courses for these types of personnel do not exist in Peru, only a very few with training in other countries were found, making analysis not meaningful.

With growth in private sector demand unequal to the increase in supply, many dentists have been forced to either leave the profession or work only part-time.

The Census of Dentists. The census found 1685 professionally active dentists in 1964<sup>a</sup>, including 30 for whom only the name, sex, and location was available. The median age of active dentists was 36 years. Women accounted for about 8 percent of the total -- 11 percent of those younger than the median age and 5 percent of those older. Just over eight percent of all dentists were graduates of foreign dental schools.

The most important finding of the census was the large number of dentists who have presumably left the profession. The figures given below for those licensed from 1924 to 1963 suggest the magnitude of this loss.

|  |           |
|--|-----------|
| Dentists licensed in the period 1924-63    |           |
| (65 years or younger in 1964)              |           |
| <hr/>                                      |           |
| Number licensed                            | 2139      |
| Active in 1964                             | -1502     |
| Estimated losses due to death              | - 74      |
| Presumed alive but professionally inactive | 563 (27%) |

<sup>a</sup>The 1964 estimate is strongly supported by data obtained two years later. In 1966 the newly created Dental College of Peru (Colegio Odontologico del Peru) required all dentists to register by September 30th as a prerequisite to continued practice. This requirement was widely publicized, had the authority of law, and the registration process was simple and decentralized. By the closure date a total of 1863 were registered, this comparing closely with the estimate of 1850-1875 active dentists that is obtained by projecting the 1964 census results (adjusting for increments and losses) to September 1966.

One explanation for the difference between the number expected and found could be emigration to other countries. Although no statistics were available, emigration has probably not been important in the past. As seen in the preceding chapter, only about five percent of Peru's physicians were estimated to be outside of the country in 1964 and almost certainly the proportion of dentists residing abroad is much less.

Table 3-1 shows the effect of age and sex on the retention rate.

Table 3-1. PERCENTAGE OF DENTISTS REMAINING ACTIVE: by Sex and Decade of Licensure: Peru, 1964

| DECADE OF LICENSURE | % OF LICENTIATES ACTIVE IN 1964 |        |      |
|---------------------|---------------------------------|--------|------|
|                     | Male                            | Female | Both |
| ALL                 | 67                              | 54     | 65   |
| 1914-23             | 18                              | 17     | 18   |
| 1924-33             | 69                              | 100    | 70   |
| 1934-43             | 82                              | 75     | 81   |
| 1944-53             | 87                              | 62     | 85   |
| 1954-63             | 64                              | 52     | 63   |

Two findings are of interest: the lower proportion of female dentists remaining active as compared with male dentists, and the sharp decline in the retention rate for dentists licensed since 1954 as compared with those licensed in the preceding three decades. The first finding, statistically significant only for those licensed since 1944, is probably best explained by the retirement of some women dentists in order to raise families. The small number of women licensed in dentistry prior to 1944 (16) makes it impossible to determine whether this is a temporary phenomenon or not.

Of more concern is the low retention rate for young dentists. Two hypotheses could explain this finding: (1) that census enumerators selectively omitted more young graduates than older ones in the institutions visited and (2) that proportionately more young dentists are marginally active (and hence not readily identifiable) or have left the profession than is the case with older ones. The first possibility seems very unlikely; the institutional census, based on a review of personnel lists, gave every indication of having a very low omission.

The second hypothesis appears much more probable though it is not possible to estimate how much of the omission it may explain.

First, it is reasonable to expect that the young dentist will be less apt to have a full-time practice than the older one. Conversations with dentists during the course of the census about the hardships of the early professional years tend to bear this conclusion out.

The picture that frequently emerged was one of the young dentist trying to get a salaried position to supplement his meager income from private practice; of how, on failing to get a position, he would scrape along for several years with part-time jobs outside of the profession plus long hours of waiting for clientele; and finally, of how he would be forced to limit his practice to only the evening hours or even drop practice altogether in order to seek a full-time salaried position outside of the profession.

Another variable is the location of training. For those licensed during the period 1944-63, 71 percent of the 1698 dentists trained in Peru were active in 1964 as compared with only 63 percent

of the 223 dentists trained abroad. Although statistically this finding is highly significant, numerically the unexpected loss among foreign-trained amounts to only about 17.

Summarizing these findings, almost 600 dentists who were presumably living and under 66 years of age in 1964 were not found in the census. Omission was relatively greater for young dentists, particularly women, and for foreign dental graduates. While some active dentists may have been missed, probably most were either inactive or spent only a small amount of time in practice -- thus suggesting that a large surplus of dentists now exists. With the future requirements for dental manpower largely dependent on private sector growth, further studies should be done to better quantify the surplus that exists and the determinants of demand for dental care.

Geographic Distribution. Table 3-2 shows the heavy concentration of dentists in urban areas.

Table 3-2. NUMBER OF ACTIVE DENTISTS AND POPULATION-DENTIST RATIOS: by Population Group: Peru, 1964

| ITEM                | POPULATION GROUP |             |                |               |               |              |
|---------------------|------------------|-------------|----------------|---------------|---------------|--------------|
|                     | PERU             | Metro. Lima | 50,000-249,000 | 25,000-49,999 | 10,000-24,999 | Under 10,000 |
| Active dentists     | 1685             | 977         | 276            | 90            | 187           | 155          |
| Persons per dentist | 6700             | 2200        | 3200           | 3300          | 5000          | 45300        |

There is a definite association between the size of a community in which a dentist works and the distribution of time spent in different types of activities. Dentists working in the larger urban

communities (25,000+) spent somewhat less than one-third of their time in salaried positions (29%), about two-thirds in private practice, and the remainder primarily in teaching students of the health sciences. Small town dentists collectively spent about six percent of their time teaching in the public school system, with the rest of their time divided equally between salaried and private practice.

Population-dentist ratios vary widely in Peru's 24 departments. In six Andean departments there was less than one dentist per 25,000 inhabitants and only in Lima, Callao and Tumbes was the ratio better than 1:5000 (Appendix I).

Characteristics of Employment. Less than half of Peru's dentists depend solely on private practice for a living (Table 3-3).

Table 3-3. DISTRIBUTION OF ACTIVE DENTISTS BY EMPLOYMENT  
CATEGORY: Peru, 1964

| EMPLOYMENT CATEGORY                   | % OF DENTISTS IN CATEGORY<br>(N=1685) |
|---------------------------------------|---------------------------------------|
| TOTAL                                 | 100.0                                 |
| Salaried job only                     | 12.0                                  |
| Self-employed only                    | 35.9                                  |
| Teaching only                         | 0.4                                   |
| Salaried job and teaching             | 0.7                                   |
| Self-employed and teaching            | 7.6                                   |
| Salaried and self-employed            | 27.3                                  |
| Salaried, teaching, and self-employed | 4.4                                   |
| Unknown                               | 11.7                                  |

Of the remainder, approximately one in four has a full-time salaried job either in a service or educational institution and the remaining three combine a salaried position with private practice. More than

four percent of the total reported having three occupational activities.

Table 3-4 shows the average number of hours worked per week by dentists in the different occupational activities.

Table 3-4. AVERAGE HOURS WORKED PER WEEK BY DENTISTS: by Employment Category: Peru, 1964

| EMPLOYMENT CATEGORY <sup>a</sup> | AVERAGE HOURS WORKED PER WEEK |
|----------------------------------|-------------------------------|
| Salaried position                | 22                            |
| Private practice                 | 25                            |
| Teaching health workers          | 11                            |
| Teaching other students          | 12                            |
| Average "full-time" dentist      | 32                            |

<sup>a</sup>Including dentists with multiple jobs.

It is notable that the average full-time dentist (total hours worked divided by number of dentists reporting hours) works only 32 hours per week. Underreporting may be a partial explanation for this low value, but the finding that all other professional groups studied reported a weekly average of about 40 hours suggests that the amount calculated for dentists may be fairly accurate. If so, this would be consistent with the hypothesis of dental underemployment.

Table 3-5 shows the distribution of salaried dentists working in service institutions. Public sector institutions employ approximately 84 percent of all salaried dentists, with the Ministry of Health and the armed and police forces being the largest employers. Most salaried dentists are evidently on a half-time basis.

**Table 3-5. DISTRIBUTION OF SALARIED DENTISTS AND AVERAGE HOURS WORKED PER WEEK: by Employer: Peru, 1964**

| EMPLOYER             | % OF SALARIED DENTISTS (N=748) | AVERAGE HOURS WORKED PER WEEK |
|----------------------|--------------------------------|-------------------------------|
| ALL                  | 100.0                          | 22                            |
| Ministry of Health   | 30.1                           | 21                            |
| Employees' Insurance | 12.4                           | 18                            |
| Workers' Insurance   | 6.2                            | 26                            |
| Armed and Police     | 29.5                           | 27                            |
| Charity institutions | 5.8                            | 18                            |
| Other government     | 11.1                           | 16                            |
| Private institutions | 4.9                            | 23                            |

More than four out of five dentists reported they practiced "general dentistry". An additional 15 percent indicated a dental specialty and less than 4 percent either reported another health activity or did not give a specialty. In contrast with the usual tendency for specialists to concentrate in the capital city, the distribution of dental generalists and specialists was approximately the same.

Fifty dentists living in small towns (under 25,000) and 41 dentists in larger cities supplemented their income with teaching positions in the general educational system. An additional 129 dentists reported academic appointments in health-related educational institutions, 107 of these in the two dental schools. Information obtained independently from the two schools suggests, however, that including almost 100 positions for part-time personnel, the total number teaching dental students is about 200.

### Dental Education

The first nationally trained dentist was graduated from the University of San Marcos in 1857, the preparation of dentists then being under the direction of the Faculty of Medicine. In 1920 this responsibility was transferred to the newly created Faculty of Dentistry and in 1961 a second Faculty of Dentistry was opened in the National University located at Ica. The status of two proposed schools to be located in Arequipa and Trujillo had not yet been determined by the time the manpower study was completed.

Requirements for admission are essentially the same at both schools and include a secondary school diploma and entrance examination. The first year of studies is termed "pre-dentistry" and is given by the Faculty of Science at San Marcos and the Faculty of Dentistry at Ica.

On completing the pre-dentistry cycle, students at San Marcos are again evaluated by examination and the better ones, up to the capacity of the first year class<sup>a</sup> are accepted into the four-year program of the Faculty of Dentistry. Students at Ica pass directly into the first year of Faculty studies. Both schools grant a Bachelors degree to students completing the fourth year and require the presentation of a thesis. At San Marcos the title of "Dental Surgeon" is awarded to candidates on completion of a series of seminars held after all other

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<sup>a</sup>Pre-dentistry capacity: San Marcos, about 70; Ica, about 45; capacity of first year of faculty studies: San Marcos, 60; Ica, 40.

requirements are met. Candidates at Ica are required to do a six-month internship in a hospital or health center, after which they take a final examination. Only dentists with the title "Dental Surgeon" are authorized to practice.

Curriculum changes, under consideration at San Marcos at the time of survey, could increase the length of dental studies at that school from five to seven years. One year would result from the elimination of the pre-professional cycle at all faculties and the substitution of a two-year general program in the sciences and humanities. The second year would be a dental internship to be served at an accredited health facility. As of 1966 neither proposal had been adopted and future projections assume continuation of the existing five-year program.

Dental School Applicants. Both schools have experienced increasing difficulty in maintaining enrollment without lowering standards. In 1960, when there was only one school, 491 applied for dental training and 60 were accepted; by 1964 the number of applicants at the two schools had declined to 265 and of entrants, to 32. Although the number enrolled in pre-dentistry increased to 51 in 1965 and 54 in 1966, authorities at the two schools were very doubtful that the programmed pre-dentistry intake could be attained. Projected output assumes an intake of 75 for 1967 and 1968, and 100 thereafter.

Repetition of Studies and Dropouts. Approximately 12 percent of all dentistry students enrolled in 1964 were repeating a year of study. In contrast to medical and pharmacy students, there is little

variation in the proportion of dental students repeating in each of the four years of study. Although the repetition rate prior to 1964 could not be calculated, officials at San Marcos indicated it has declined substantially in recent years.

The dropout rate was estimated by comparing cohorts of first and last year medical students (rather than graduates) due to the considerable lag observed between completing the fourth year and graduation. According to school officials the most likely explanation for this delay in graduating is due to the thesis requirement. Using this method, the dropout rate by the last year of studies for cohorts entering in 1960, 1961 and 1962, was about 32, 22, and 20 percent, respectively. Since these estimates include neither the loss incurred during pre-dentistry nor between the fourth year and licensure, they are low. Output projections assume that approximately 25 percent of those entering the pre-dentistry year at the two schools will not complete their training.

Teaching Personnel. The number of faculty and faculty-student ratios found at the two schools of dentistry are given in Table 3-6. Of interest is the threefold differential in the faculty-student ratio found at San Marcos as compared with Ica. Although this difference may be somewhat exaggerated since at the time of survey Ica did not yet have students enrolled in the clinical years (where proportionately more faculty are required), the gap is still wide. Assuming that Ica will eventually attain a ratio at least equal to that found at San Marcos in 1964, this means that approximately 25 additional

**Table 3-6. TEACHING PERSONNEL AND FACULTY-STUDENT RATIOS: by Schools of Dentistry: Peru**

| <b>ITEM</b>  | <b>ICA (1963)</b> | <b>SAN MARCOS (1964)</b> |
|--|-------------------|--------------------------|
| <b>Number of faculty</b>                                 |                   |                          |
| <b>Full- and half-time</b>                               | <b>6</b>          | <b>103</b>               |
| <b>Part-time</b>   | <b>36</b>         | <b>61</b>                |
| <b>Full-time equivalent faculty</b>                      |                   |                          |
| <b>Actually employed</b>                                 | <b>6.8</b>        | <b>67.1</b>              |
| <b>Additional desired</b>                                | <b>5.0</b>        | <b>0</b>                 |
| <b>% of teaching time by full- and half-time faculty</b> | <b>58</b>         | <b>93</b>                |
| <b>F.T.E. faculty per 10 students</b>                    |                   |                          |
| <b>Actual</b>  | <b>0.8</b>        | <b>2.2</b>               |
| <b>Desired<sup>a</sup></b>                               | <b>1.6</b>        | <b>3.0</b>               |

<sup>a</sup>Based on F.T.E. faculty desired and the programmed capacity at the time of survey. As Ica adds the clinical years the ratio will probably improve.

F.T.E. faculty (or, about 50 persons) will be required for a total of about 104 F.T.E. personnel.

The Cost of Dental Education. With decreasing enrollments and increasing expenditures at both schools, the cost of preparing a dentist in 1964 was almost three times as great as in 1961.

Table 3-7 gives the annual estimates of the cost of dental education for the four-year period.

Table 3-7. COST OF DENTAL EDUCATION: by Year and Faculty of Dentistry: Peru, 1961-1964

| FACULTY AND COST CATEGORY     | COST (1964 Soles), BY YEAR |        |        |        |
|-------------------------------|----------------------------|--------|--------|--------|
|                               | 1961                       | 1962   | 1963   | 1964   |
| <u>San Marcos<sup>a</sup></u> |                            |        |        |        |
| Cost per student-year         | 6,300                      | 9,200  | 16,700 | 17,300 |
| Cost per graduate             | 28,000                     | 41,000 | 75,000 | 78,000 |
| <u>Ica<sup>b</sup></u>        |                            |        |        |        |
| Cost per student-year         | 1,500                      | 4,900  | 7,800  | 15,900 |

<sup>a</sup>Excluding cost of pre-dentistry, borne by Faculty of Science. The cost per graduate is corrected for an assumed 25 percent student attrition.

<sup>b</sup>Including cost of pre-dentistry, borne by Faculty of Dentistry. Cost per graduate not calculated since enrollment was not yet complete by 1964.

With San Marcos not contemplating any substantial increase in the number of faculty employed nor major capital investments, the cost per graduate (excluding pre-dentistry) will probably not exceed 100,000 soles (\$3,700) for the remainder of the 1960's.

Assuming Ica continues to operate at about 60-65 percent of capacity, student-year costs are likely to rise to about S/. 30,000 as new faculty are added. Alternatively, if enrollment were increased to the programmed capacity of slightly over 200 (in five years of studies), costs would stabilize at about S/. 20,000, comparable to the amount calculated at San Marcos.

Physical Facilities. At the time of survey San Marcos had just completed construction and equipping of a new building and Ica was about to start. Authorities at both schools reported that facilities and equipment were, or soon would be, adequate for their programmed capacity.

#### Future Supply

The assumptions used in projecting the output of Peru's two dental schools are summarized in Table 3-8.

Table 3-8. PROJECTED ENTRANTS, ATTRITION RATE AND GRADUATES:  
Peruvian Schools of Dentistry: 1964-83

| DECADE  | ENTRANTS TO<br>PRE-DENTISTRY | ATTRITION<br>(%) | GRADUATES |
|---------|------------------------------|------------------|-----------|
| 1964-73 | 75 <sup>a</sup>              | 25               | 730       |
| 1974-83 | 100                          | 25               | 750       |

<sup>a</sup>Prior to the class entering pre-dentistry in 1967 the actual number enrolled in each year of study was used to project output.

Because of the low enrollments at the schools already in operation, no new schools are projected for the foreseeable future.

The number of dentists annually validating foreign degrees increased very markedly during the past decade compared with the preceding one. From 1944 to 1953 only 19 validations were registered in San Marcos, whereas in the next decade the number rose to 204. The number of validations varies greatly from year to year, reaching a peak of 60 in 1960 and less than 10 in 1954, 1955, and 1962. It is assumed that approximately 150 dentists will validate foreign degrees in each of the next two decades.

Depending on the rate of loss assumed, there is a difference of 1000 dentists between the optimistic (III) and conservative (I) projections of the 1984 supply (Table 3-9).

Table 3-9. SUPPLY OF ACTIVE DENTISTS: by Alternative Hypothesis of Retention: Peru, 1964, 1974 and 1984

| YEAR | NUMBER OF DENTISTS    |                         |                                |
|------|-----------------------|-------------------------|--------------------------------|
|      | Present Retention (I) | Improved Retention (II) | Total Potentially Active (III) |
| 1964 | 1685                  | 1685                    | 2100                           |
| 1974 | 2000                  | 2300                    | 2800                           |
| 1984 | 2400                  | 2900                    | 3400                           |

|      | PERSONS PER DENTIST |                    |                          |
|------|---------------------|--------------------|--------------------------|
|      | Present Retention   | Improved Retention | Total Potentially Active |
| 1964 | 6700                | 6700               | 5400                     |
| 1974 | 7700                | 6700               | 5500                     |
| 1984 | 8700                | 7200               | 6200                     |

Alternative hypothesis II (improved retention) appears the most reasonable one in the case of dentists. As both the population and purchasing power increase, dentistry will probably become more attractive than is

now the case and the loss rate will decline. The other two hypotheses seem unrealistic in that one (I) assumes the population-dentist ratio will deteriorate substantially despite the availability of trained dentists in the country and the other (III) assumes that all dentists now working in other jobs will return to dentistry. If hypothesis II is adopted as the most probable, the current output of dentists, supplemented by only a slight increase in the second decade, will be adequate to maintain the 1964 population-dentist ratio almost until 1984.

Chapter 4

PHARMACISTS

Current Supply

A career in pharmacy held little attraction for Peruvians in the mid-1960's. At the time of survey, the three schools of pharmacy had twice as many first year vacancies as qualified applicants. Even many graduates find the career unpromising and currently almost one out of every two leaves the profession.

The plight of pharmacy appears to be due in part to the profound changes that have occurred in the production, packaging and distribution of pharmaceutical products. Formerly, the pharmacist compounded drugs at the point of final distribution; now he is often little more than a retail clerk, dispensing pre-packaged medicines. For the practicing pharmacist the simplification of his job brought about by industry has allowed him to shift much of the responsibility for pharmacy operation to untrained auxiliary personnel. Indeed, it was often said during the manpower census that as a result of the changing nature of pharmaceutical practice, many "nominally active" pharmacists in fact hold two jobs: a part-time one devoted to complying with the

various official requirements of pharmacy operation,<sup>a</sup> and a full-time job in some other field, frequently unrelated to pharmacy.

At the same time that the pharmacist became less essential to the operation of a pharmacy, the supply of pharmacists increased sharply. In the decade 1954-63 more new pharmacists were licensed than in the previous fifty years. The growing demand for pharmacists in industry has absorbed some of the increased supply but the limited capacity of the private sector to utilize the balance has apparently forced many to seek jobs outside of the profession.

Besides professional pharmacists, Peruvian law provides for the examination and licensure of untrained personnel with prior experience in pharmacy. These persons, termed practicos, operate small drugstores handling a limited variety of products in communities lacking a pharmacy. Since there were only several hundred drugstores of this type in 1964 and the tendency is towards their elimination, the supply of and demand for non-professional pharmacy personnel was not studied.

The Census of Pharmacists. A total of 1416 pharmacists were found in active practice in 1964. The median age was 36 years. Women pharmacists represented 29 percent of those older than the median, 68 percent of those younger, and 54 percent of the total.

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<sup>a</sup>Peruvian law requires that each pharmacy have a professional pharmacist in full-time attendance and does not allow multiple pharmaceutical jobs. In many communities, however, these requirements, and particularly the first one, have been difficult to enforce.

Only three percent of the total received their professional training abroad

The actual number of pharmacists in practice was probably considerably greater than the number found. According to the census of 1964 about 57 percent of the surviving pharmacists 65 years and under were active. Using data obtained two years later from the Bureau of Pharmacy of the Ministry of Health, the figure was 67 percent.<sup>a</sup>

To decide which estimate was more accurate, the following procedures were used:

- (1) The retention rate calculated for 1966 from registry data was transposed to 1964, suggesting that 1720 pharmacists should have been found in that year instead of the 1416 actually found.
- (2) The occupational distribution recorded in the registry was transposed to the 1720 pharmacists and the estimated number in each category was compared with the number actually found in the 1964 census.

Only for industrial and wholesale pharmacy was there any significant disagreement between the two sources of data, these occupational categories accounting for 85 percent of the discrepancy. Since the manpower census was oriented primarily towards identifying those in

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<sup>a</sup>In 1964 the Bureau of Pharmacy provided information on the number of pharmaceutical establishments in existence but could not complete data on pharmacists. Two years later, following changes in the Bureau's registry system, this became feasible and a special study was made in September, 1966.

pharmacies, the schools of pharmacy and the health agencies; the finding of a substantial omission among industrial and wholesale pharmacists was not surprising. Based on these findings the estimate of the mid-1964 supply of active pharmacists was revised from 1416 to 1720.

Table 4-1 shows the proportion of licentiates found active in the 1964 census, uncorrected for assumed census omission, and the revised estimate.

Table 4-1. ESTIMATED PERCENTAGE OF PHARMACISTS REMAINING ACTIVE: by Sex and Decade of Licensure: Peru, 1964

| DECADE OF LICENSURE | % OF LICENTIATES ACTIVE IN 1964 |        |      | Corrected <sup>a</sup><br>(N=1720) |
|---------------------|---------------------------------|--------|------|------------------------------------|
|                     | Uncorrected census results      |        | Both |                                    |
|                     | Male                            | Female |      |                                    |
| ALL                 | 53                              | 53     | 53   | 62                                 |
| 1914-23             | 29                              | -      | 29   | 29                                 |
| 1924-33             | 59                              | 64     | 58   | 72                                 |
| 1934-43             | 68                              | 59     | 66   | 72                                 |
| 1944-53             | 51                              | 82     | 65   | 72                                 |
| 1954-63             | 53                              | 46     | 48   | 60                                 |

<sup>a</sup>Assumptions used were as follows: (1) no omission occurred in the 1914-23 cohort since most were likely in pharmacies where the census was most accurate; (2) omission was greatest in the 1954-63 cohort (industrial pharmacy has grown rapidly since 1960 and likely attracted many more young pharmacists than older ones) and hence the retention rate was increased proportionately more; (3) the balance of the "missed" pharmacists were allocated to the next three cohorts and the average rate calculated.

Two findings are of interest. First, according to the uncorrected rates, comparison of the proportion of men and women pharmacists remaining active reveals neither an overall sex difference nor a systematic pattern among individual cohorts. Secondly, the much

lower retention rate for the youngest cohort as compared with older ones suggests the impact the recent expansion of supply has had on job opportunities within the profession.

Summarizing, about 1720 pharmacists are estimated to have been active in mid-1964. Although census omission makes it impossible to calculate accurate cohort retention rates, there is suggestive evidence that sex is not strongly associated with the proportion retained and that age is. The number of inactive pharmacists 65 years and under was probably close to 800.

Geographic Distribution. The strong urban concentration of pharmacists is evident in Table 4-2.

Table 4-2. ESTIMATED NUMBER OF ACTIVE PHARMACISTS AND POPULATION-PHARMACIST RATIOS: by Population Group: Peru, 1964

| ITEM                   | POPULATION GROUP |                |                    |                   |                   |                 |
|------------------------|------------------|----------------|--------------------|-------------------|-------------------|-----------------|
|                        | PERU             | Metro.<br>Lima | 50,000-<br>249,999 | 25,000-<br>49,999 | 10,000-<br>24,999 | Under<br>10,000 |
| Active Pharmacists     | 1720             | 1050           | 320                | 60                | 180               | 110             |
| Persons per Pharmacist | 6600             | 2100           | 2800               | 4900              | 5100              | 63,800          |

The 1964 census results were corrected by allocating the 304 "omitted pharmacists" to the largest two population groups in the same ratio that pharmaceutical industries and wholesale drug houses are found in these two groups. All figures are rounded to the nearest 10.

In contrast, the distribution of pharmacies was considerably more equitable and suggests a ratio useful for estimating the future demand for retail pharmacists. In 1964, districts of 10,000+ urban residents

averaged one pharmacy per 3300 population, this ratio varying from 1:3800 in small towns to 1:3000 in metropolitan Lima. The relationship between pharmacies, pharmacists and population is considered in greater detail in Chapter 10.

Characteristics of Employment. Almost three of every four pharmacists (73%) worked in a pharmacy in 1964, while most of the remainder were either in industry (16%) or wholesaling (7%). About two percent each were in administration and teaching. Only seven percent of the active pharmacists are estimated to have had more than one job.

The traditional pattern of the self-employed pharmacist appears to be undergoing change. At the time of study only about two in five operated their own pharmacy while over half of the total worked as salaried employees.

The public sector employed only 241 pharmacists (14% of the estimated total). Thirty-five percent worked in the armed and police forces system, 27 percent in the Ministry of Health, and the remainder were distributed approximately equally among the insurance funds and the charity system. Those in the public sector reported an average work week of 31 hours compared with 41 hours for pharmacists in the private sector.

Almost half of the 131 pharmacists reporting an academic position taught outside of the health sector. Such employment was much more frequent in the smaller communities where the pharmacist's training in the sciences makes him well qualified to teach in the school system. Although the total number of pharmacists employed in the

general educational system is not known, it probably exceeds several hundred. Suggestive evidence of the willingness of pharmacists to seek low paying jobs is the small but continuing number who apply for positions in the Ministry of Health as laboratory technicians or in other fields unrelated to pharmacy.

### Pharmacy Education

Instruction in pharmacy was first offered in 1810 at the University of San Marcos, the first three graduates receiving their degrees in 1812. For more than a century training in pharmacy was the responsibility of the medical school until, in 1920, this was transferred to a newly created Institute of Pharmacy. The Institute assumed its present form in 1943 as the Faculty of Pharmacy and Biochemistry.<sup>a</sup> In 1936 a second Faculty of Pharmacy was opened in Trujillo and in 1961, a third one in Ica.

In 1920 pharmacy training required three years beyond completion of secondary school. By 1964 the curriculum had increased to four years at Trujillo and five years at San Marcos and Ica, with all schools requiring an additional "pre-pharmacy" year of general studies in the sciences and humanities. At the time of the survey San Marcos was considering increasing the duration of the pre-pharmacy cycle by one year, a change which would raise the total number of years required

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<sup>a</sup> Authorities at San Marcos indicate that students primarily interested in biochemistry would be much more apt to enroll in either the Faculty of Chemistry or the Faculty of Sciences (School of Biological Sciences) than in the Faculty of Pharmacy and Biochemistry, where the curriculum is oriented towards pharmacy.

to seven. For purposes of projecting future output, however, it is assumed that the situation found in 1964 will remain unchanged.

Pharmacy Applicants. The three schools of pharmacy were unable to provide complete and internally consistent data on the number of applicants and entrants to pre-pharmacy training. Sufficient information was available, however, to quantify the marked decline in both categories between 1960 and 1964; despite the addition of a third school in the five-year period the number of applicants dropped from 750 to 450 and the number of entrants from 150 to 64.

It is difficult to know whether the small number of students entering pre-pharmacy training in 1964 will be typical of years to come. If this proves to be the case, the programmed enrollment of approximately 145 first-year pharmacy students (Ica, 40; San Marcos, 60; Trujillo, 45) will be less than half filled. Output projections for 1972 and 1973 are based on an assumed intake of 75 pre-pharmacy students in 1967 and 1968, and for the decade ending in 1983, on an intake of 100 students annually.

The fact that approximately two-thirds of all students are women suggests that secondary school graduates now view pharmacy more as a part-time career -- and hence appropriate for a woman -- than as a full-time occupation. If this hypothesis is true, the chances of increasing the number of applicants in the near future is small.

Repetition of Studies and Dropouts. About 14 percent of the students enrolled in the first year of faculty studies in 1963 and 1964 were repeating the year. This proportion abruptly declines in

the second year and by the fourth year averages only 2.3 percent.

The overall repetition rate of 5.5 percent found in the two-year period represents a marked improvement over the situation at San Marcos almost ten years earlier; during the period 1955-57, repeating students accounted for approximately 14.3 percent of total enrollment. Although a further reduction in the repetition rate would improve the utilization of scarce teaching resources, such an objective does not now appear realistic due to the inadequate preparation of many of the students entering training.

From 1955 to 1959 a total of 1153 students entered the first year of pharmacy at San Marcos and Trujillo. Five years later this same cohort produced 793 graduates for a dropout rate of 31 percent (29% at San Marcos; 41% at Trujillo). In projecting future output it is assumed that 70 percent of new first-year students and 65 percent of new pre-pharmacy entrants will complete their studies. In fact, if the changes that have led to a decline in the repetition rate have also influenced the dropout rate, these assumptions may be unduly pessimistic.

Teaching Personnel. The 1963-64 survey of the schools of pharmacy found substantial inter-school differences in faculty staffing. As shown in Table 4-3 and based on actual enrollment, the schools at San Marcos and Trujillo had almost double the teaching time available per ten students as did the new school at Ica. If these ratios are calculated according to the programmed capacity of each school at the time of survey, the variation among the three schools is accentuated even more. Since both provincial schools

**Table 4-3. SCHOOL OF PHARMACY FACULTY AND PROFESSOR-STUDENT RATIOS:**  
 by School of Pharmacy: Peru, 1963-64

| SCHOOL AND<br>YEAR OF<br>DATA | PROFESSORS |                          | % OF TIME<br>CONTRIBUTED<br>BY FULL- &<br>HALF-TIME<br>PROFESSORS | FULL-TIME EQUIVALENT<br>PROFESSORS PER TEN<br>STUDENTS |                                     |
|-------------------------------|------------|--------------------------|---|--|-------------------------------------|
|                               | Persons    | Full-time<br>equivalents |   | Actual<br>enrollment                                   | Programmed<br>capacity <sup>a</sup> |
| Ica (1964)                    | 30         | 4.1                      | 50  | 0.5  | 0.4                                 |
| San Marcos (1964)             | 82         | 33.9                     | 88  | 0.9  | 1.5                                 |
| Trujillo (1963)               | 19         | 14.1                     | 99  | 0.8  | 0.8                                 |

<sup>a</sup>Programmed capacity was approximately 114 for Ica (three classes only), 225 for San Marcos, and 174 for Trujillo. Unless faculty are increased commensurately, ratios at San Marcos will decline as the fifth academic year is added.

indicated the need for additional faculty, their ratios will probably approach that found at San Marcos as additional funding becomes available.

Despite these findings, the schools of pharmacy do not appear to be facing the staffing difficulties found in medicine and nursing. From 1963 to 1964 San Marcos increased the amount of teaching time available by almost 40 percent, and the other schools reported lesser but substantial gains. School authorities expressed the opinion that if new positions could be budgeted, faculty would be found.

The Cost of Pharmacy Education. Declining enrollments and rising budgets have combined to increase sharply the cost of preparing a pharmacist. From 1961 to 1964 the real average cost of a student-year increased threefold to S/. 18,300 (\$680). The cost per graduate<sup>a</sup> in 1964 was estimated at S/. 97,000 (\$3620), or 40 percent of the cost of training a physician.

The cost of pharmacy education will likely continue to rise, even without a significant change in expenditures. In 1964 the student-year cost was depressed somewhat due to the large number of students enrolled in the latter years of studies at San Marcos. Once these students have graduated and enrollment is stabilized at a lower level, the average cost per graduate will likely approach S/. 150,000 (\$5600). Since many graduates do not use their training, the cost per professionally active pharmacist will soon exceed S/. 200,000.

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<sup>a</sup>Assuming that budgeted funds will exceed actual expenditures by 10%, attrition is 30%, and San Marcos students require a fifth year of studies. Costs of pre-pharmacy year are excluded.

Physical Facilities. Facilities and equipment were generally adequate for the programmed enrollment at San Marcos and Ica, and very deficient at Trujillo, where lack of funds has delayed construction of an entire new university campus.

#### Future Supply

Using the planning assumptions outlined in the preceding sections and the number enrolled in 1966, it is estimated that the three Peruvian schools will graduate 1080 pharmacists in the decade 1964-73 and 810 in the following one. An additional 50 pharmacists are expected to validate foreign degrees in each decade based on the relatively constant average of 4.9 validations per year in the decade 1954-63.

The effect of these increments to the supply of active pharmacists in 1974 and 1984 is shown in Table 4-4. For reasons already noted, the baseline supply in 1964 is estimated at 1720 pharmacists and not the 1416 actually enumerated. According to these projections, supply can be adjusted to meet almost any reasonable level of demand if job opportunities in the health sector are sufficiently advantageous to keep pharmacists out of other occupations.

Table 4-4. SUPPLY OF ACTIVE PHARMACISTS: by Alternative Hypothesis of Retention: Peru, 1964, 1974 and 1984

| YEAR | NUMBER OF             |                         | PHARMACISTS                    |
|------|-----------------------|-------------------------|--------------------------------|
|      | Present Retention (I) | Improved Retention (II) | Total Potentially Active (III) |
| 1964 | 1720                  | 1720                    | 2400                           |
| 1974 | 2300                  | 2500                    | 3300                           |
| 1984 | 2700                  | 3000                    | 3700                           |

| YEAR | PERSONS           | PER                | PHARMACIST               |
|------|-------------------|--------------------|--------------------------|
|      | Present Retention | Improved Retention | Total Potentially Active |
| 1964 | 6600              | 6600               | 4700                     |
| 1974 | 6700              | 6200               | 4700                     |
| 1984 | 7800              | 7000               | 5700                     |



Chapter 5

NURSES

Current Supply

It is widely conceded that most of the nation's hospitals and outpatient facilities are inefficient. In many general hospitals the average duration of patient stay is over 20 days and only rarely is it less than 15. Evidence presented in Chapter 9, on demand, suggests that doctors see, on the average, less than three patients per hour. Auxiliary nurse effectiveness, too, is considered low. In each case one of the most important factors for the low productivity is the lack of a sufficient supply of nursing personnel.

The great contribution that nurses can make to health care has come to be recognized only within the last several decades. Previously, drugs were relatively ineffective, surgery was dangerous, and health services rarely extended beyond the hospital walls. As recently as 1940, when three-fourths of the nation's hospital beds were under the direction of welfare boards, the emphasis was more on providing a haven for the sick poor than on rapid cure and rehabilitation. In most hospitals of this period the primary role of the nursing staff was to direct the small army of untrained auxiliaries actually responsible for patient care.

With the opening of the Workers' Insurance Fund hospitals in the early 1940's hospital care began to undergo rapid change. Now there was a premium on returning the worker promptly to his family and job; hospital staff could no longer wait for his recovery, they had to promote it.

As the orientation shifted away from providing custodial care and towards cure and prevention, manpower requirements also began to change. Auxiliary personnel could not discharge the new functions nor could they be assumed by the already overworked doctors. The nurse was the vital link that had to be strengthened. The number of nurses graduating annually increased almost fivefold from the late 1930's to the early 1950's, but demand continued to outpace supply. The opening of two Employees' Fund hospitals and the recent completion of over 10 hospital-health centers by the Ministry of Health has brought the shortage of nursing personnel to severe proportions. In 1964 close to 1000 hospital beds were estimated to be unused for lack of nurses.

The quantitative shortage has not been the only problem. There is also a growing demand for improved quality and versatility. Post-basic courses in some nursing specialties have been developed but their output is still far short of meeting the needs.

The Census of Nurses. The 1964 census identified 3103 professionally active nurses. Of this number, the 245 (7.9%) male nurses had a median age of 44 years and the 2858 (92.1%) female nurses a median age of 31 years. Foreign graduates represented 3.5 percent of

the total. Information on current work activities was sufficiently complete for analysis on 98 percent of the active nurses.

During the forty-year period 1924-63, 4504 nurses were licensed in Peru. The 1964 census found 2990 nurses from this cohort, an additional 114 were estimated to have died, and about 40 were known to be abroad at the time of census, leaving approximately 1360 nurses unaccounted for (31% of those surviving and 60 years or younger). The omission of active nurses, however, is almost certainly very small -- less than the 2.5 percent maximum estimate for the doctor census. There are essentially no work opportunities for nurses outside of a health institution and the procedure used in the third census of checking the payroll lists of each of Peru's health facilities made omission of employed nurses very unlikely.

Geographic Distribution. The distribution of active nurses according to size of urban population is shown in Table 5-1. Metropolitan Lima, with only about 18 percent of the population, has almost 70 percent of all active nurses. There is no significant association between a nurse's age and her location in the different sizes of urban communities.

Table 5-1. NUMBER OF ACTIVE NURSES AND POPULATION-NURSE RATIOS:  
by Population Group: Peru, 1964

|                            | PERU | POPULATION GROUP |                    |                   |                   |                 |
|----------------------------|------|------------------|--------------------|-------------------|-------------------|-----------------|
|                            |      | Metro.<br>Lima   | 50,000-<br>249,999 | 25,000-<br>49,999 | 10,000-<br>24,999 | Under<br>10,000 |
| Number of<br>active nurses | 3103 | 2195             | 374                | 112               | 237               | 185             |
| Persons per<br>nurse       | 3600 | 1000             | 2300               | 2600              | 3900              | 37900           |

Calculation of the population-nurse ratio by department shows a wide variation with only 6 of the 24 departments having more than one nurse per 5000 inhabitants and 10 having less than one per 20,000 (Appendix E).

Characteristics of Employment. The very unequal distribution of nurses among the several systems of health care is evident in Table 5-2.

Table 5-2. DISTRIBUTION OF NURSES AND PERCENTAGE IN HOSPITAL SERVICE: by Employer: Peru, 1964

| EMPLOYER             | % OF NURSES<br>(N=3103) | % IN HOSPITALS <sup>a</sup><br>(N=2998) |
|----------------------|-------------------------|---|
| TOTAL                | 100.0                   | 86                                      |
| Ministry of Health   | 30.3                    | 78                                      |
| Employees' Insurance | 15.4                    | 97                                      |
| Workers' Insurance   | 13.8                    | 96                                      |
| Armed & Police       | 16.8                    | 80                                      |
| Charity Institutions | 11.7                    | 99                                      |
| Private Institutions | 8.2                     | 93                                      |
| Other                | 3.8                     | 0                                       |

<sup>a</sup>Of those for whom hospital status is known.

To meet the needs of less than 15 percent of the population, the social insurance funds and the armed and police forces utilized 46 percent of the nurse supply. In contrast, the Ministry of Health and the charity hospitals combined had only about 42 percent of the nurses to operate two-thirds of the nation's hospital beds and meet the health care needs of most of the population.

Of those nurses for whom the work status is known, 86 percent were in hospitals, 12 percent in public health units, polyclinics,

schools, and other service institutions not associated with hospitals. and 2 percent in teaching. With their numerous posts in rural areas and in small towns, the Ministry of Health and the armed and police forces' system employed the majority of nurses working in a service capacity outside of a hospital.

Great disparity was found among the several systems in the number of hospital-based nurses and nurse-auxiliaries available per ten beds. According to figures presented in Table 5-3, the Employees' Insurance Fund had almost eleven times as many professional nurses per ten beds as did the charity system, and there is more than a threefold difference in the number of nurse auxiliaries available.

Table 5-3. NUMBER OF HOSPITAL-BASED NURSES AND NURSE AUXILIARIES AVAILABLE PER TEN BEDS: by System of Health Care: Peru, 1964

| SYSTEM OF HEALTH CARE | NURSES PER TEN BEDS |           |      |
|-----------------------|---------------------|-----------|------|
|                       | Professional        | Auxiliary | Both |
| ALL                   | 1.0                 | 2.4       | 3.4  |
| Ministry of Health    | 0.8                 | 2.2       | 3.0  |
| Employees' Insurance  | 4.3                 | 5.8       | 10.1 |
| Workers' Insurance    | 1.6                 | 3.9       | 5.5  |
| Armed & Police        | 2.2                 | 1.7       | 3.9  |
| Charity               | 0.4                 | 1.8       | 2.2  |
| Private               | 0.7                 | 2.4       | 3.1  |

The more favorable staffing ratios used by the Social Insurance Funds in part explain why their hospital beds are almost twice as productive in terms of patient discharges as are those of the charity hospitals.

Seventy-eight percent of the active nurses were engaged in general nursing duties and 22 percent in a specialty. Of the latter

group, 8 percent were in administration and supervision, 3 percent each in anesthesia and public health, 1 percent in academic nursing, and 6 percent in other specialties. Although the shortage of specialized personnel is probably most acute in public health, it is also of note that so few nurses work in anesthesia. Many countries have shown that with adequate training and supervision, nurses can very effectively function as anesthetists and thereby release physicians for other types of activities.

Early Retirement. Table 5-4 gives the retention rate of Peruvian nurses as a function of time since licensure.

Table 5-4. PERCENTAGE OF NURSES REMAINING ACTIVE: by Decade of Licensure: Peru, 1964

| DECADE OF LICENSURE | % OF LICENTIATES ACTIVE |
|---------------------|-------------------------|
| ALL                 | 66                      |
| 1914-23             | 18                      |
| 1924-33             | 42                      |
| 1934-43             | 49                      |
| 1944-53             | 60                      |
| 1954-63             | 76                      |

While the loss of nurses due to early retirement is not unusually high,<sup>a</sup> the manifest shortage of nursing personnel makes it imperative

<sup>a</sup>According to the findings of the Turkish Health Manpower Study the overall activity rate for professional nurses in that country was 66 percent in 1964. The comparable figure for American nurses, standardized to the approximate age distribution of Peruvian nurses, is well over 60 percent.

to explore every means of maximizing the number retained. If only one-third of the nurses now in retirement could be induced to return to active duty, the supply of nursing personnel could be increased by almost 500.

According to many nurses interviewed during the course of the census, one means of attracting a considerable number back from retirement would be to offer part-time employment so that family and professional responsibilities could be more easily combined. Another measure, of particular importance for those inactive for some years, would be to provide short refresher courses. In a recent study done in the United States, of 453 inactive nurses given such training, 77 percent decided to return to active practice.<sup>22</sup> The possible effect of these and other policies on the retention rate should be studied at the earliest opportunity.

Male Nurses. Eighteen percent of the 245 male nurses in active service in 1964 were in communities of less than 10,000 urban population as compared with only 5 percent of the female nurses. More than three times as many of the male nurses (42%) worked outside of hospitals as did female nurses (13%).

The number of young men taking up nursing as a career has declined notably since the period 1934-53, when over 200 were graduated. Although precise data were not available on the number of men studying nursing in 1964, it probably did not exceed two or three in each year of study. If this trend continues, it will not be long before nursing is regarded as exclusively a profession for women.

Such a development would be unfortunate for at least three reasons. First, the need for nurses to serve in isolated posts of the highlands is already great, and promises to grow in the future. If the Ministry of Health were to replace the inadequately trained sanitario with a nurse qualified in public health and minor medical care, the demand for such personnel to serve in rural areas would be very great. For obvious reasons it would probably be much easier to attract male nurses into such a program than females.

The importance of early retirement as a factor aggravating the shortage of nursing personnel has already been discussed. Probably the most effective way to reduce this problem would be to increase the proportion of men studying nursing. Instead of contributing approximately 29 years of service, the male nurse might be expected to give about 40 years to the profession -- almost a 40 percent increase at no additional training cost.

The principal way to improve the supply of nursing personnel is to increase the output of the schools of nursing. Although the supply of qualified applicants for nursing training currently appears adequate, further increases in nursing school capacity may result in a shortage of qualified female applicants within the next five or ten years. By making the profession open and attractive to young men as well as women, the pool of applicants could be greatly expanded to meet the needs of the new schools.

Nursing Education

In 1963 there were ten nursing schools in full operation, eight in Lima and two in the small provincial cities of Tacna and Tarma. The Ministry of Health operated three schools, including both provincial ones, the social insurance funds each operated one school, and the remaining five were administered by the Ministry of Government (police), the Ministry of War, a private hospital, and two large charity hospitals. All schools required applicants to have completed secondary school and offered a three-year diploma (hospital) program.

By 1966 six new schools offering a combined university-hospital program (study duration: one university year and three hospital years at four schools; two years and three at two schools) had been opened and plans were well advanced to open a seventh in 1967.<sup>a</sup>

The recent changes in nursing education can be better understood when seen in the context of the past. Viewed in this perspective, nursing education and practice during the latter half of the 1960's will be entering a third stage in the evolution the profession has undergone since the first class of Peruvian nurses was graduated in 1911.

For almost forty years, nursing in Peru was primarily a technical job that required technical training. As a technician, the nurse was

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<sup>a</sup>Arequipa (National and Catholic Universities, both in 1964), Chiclayo (1964), Iquitos (1966), Puno (1965), San Marcos (1967) and Trujillo (1965).

trained to carry out defined procedures in which the opportunity for independent judgment was very restricted. The quality of training offered by the nursing schools during this period varied markedly but in most cases was quite low. Limited by poor education and handicapped by the lack of trained auxiliaries to assist them, these nurse pioneers had little opportunity to realize the full potentialities of their profession.

In the late 1940's nursing began to enter a transitional stage which is still in progress. In nursing education, this second period has been characterized by decreased variation among the schools of nursing and strengthened quality of instruction. The first effort to achieve greater uniformity dates back to 1947 when statutes were approved outlining the basic requirements for a nursing school, the means of enforcing them, and the requirements for admission. In 1951 the Permanent Committee for the Control of Nursing Schools, established as the regulatory body for the 1947 statutes, first required that all nurse graduates seeking licensure should take a final examination administered by the Committee. Gradually the various standards were implemented and by the early 1960's all schools followed similar procedures for the selection, training and evaluation of their students.

While important progress was made towards the improvement and standardization of some of the more easily identified aspects of nursing education, much remained to be done. In 1962 the Committee carried out for the first time a study of the qualitative aspects of nursing training. In its report,<sup>23</sup> the Committee concluded that

only one of the twelve schools that then existed fulfilled the minimal educational requirements considered necessary. In seven the director had essentially no control over the budget. Serious problems were noted in the way teachers and school directors were selected, and little attention was generally given to either the applicant's academic qualifications or her need for postgraduate training. In some schools it was found that extraneous factors predominated in the selection of students for admission. The Committee further observed that while the general curriculum requirements were followed in all schools, there was wide variation among them in the way courses were conducted and in the facilities and materials available.

Other criticisms, besides those of the Committee, were voiced. Despite a growing awareness of the importance of prevention, nursing training still was focused almost entirely on curative services. The rotation in public health lasted only six weeks and was poorly integrated with the rest of the program. Nursing students spent long hours on hospital wards with little or no supervision -- the strenuous shifts frequently resulting in inattentive students in the classroom. The dependence of the hospital schools on large numbers of part-time faculty (178, or 57% of the total in 1964) meant that coordination between the different components of the curriculum was often lacking.

Reflecting on the manifold problems of the hospital schools, nursing leaders were concerned lest remedying these deficiencies would affect only the form and not the substance of nursing education. They were also doubtful that the traditional three-year program could provide either the quantity or quality of nursing leadership the

evolving health programs required. The idea was therefore conceived in 1963 of opening a number of new nursing schools in provincial universities in association with the new regional hospitals being built by the Ministry of Health. After one or several years of university studies, nursing students would then receive three years of hospital training. The advantages of such a policy were evident: nursing students would get better and more training in the natural and social sciences; courses could be added or strengthened in administration and supervision, community health, and the nursing specialties; and the severe shortage of nursing personnel that was developing in the regional hospitals would be eased. Although at first little thought was given to coordinating the university and hospital training phases, this has now been accepted as necessary and plans for training nurse instructors are based in part on this objective.

In judging the appropriateness of these changes in nursing education the central issue is not whether they should take place -- they are clearly consistent with trends evident in nursing throughout the world -- but how fast. If progress is to be real, great efforts will be necessary to strengthen the provincial universities, to prepare a sufficient number of qualified nursing instructors, and to develop effective coordination between the university and hospital programs. These efforts, and the lengthened period of training required, will mean that the number of nurses prepared annually will be substantially less than would otherwise be possible if the hospital schools were expanded and strengthened.

The projected deficit of nursing personnel is so great that any measures which improve quality at the expense of quantity must be given careful consideration. Ways to strengthen the existing schools should be found that do not either increase the duration of studies or make admission more difficult. These issues will be considered in greater detail in the chapters on demand.

Nursing School Applicants. During the three-year period, 1962-64, there was an average of 3.8 applicants for each available place in the entering classes of the ten nursing schools. The ratio of "qualified" applicants (as judged by nursing school authorities) to available spaces was much lower, averaging only 1.3-to-1. In 1964, six of the ten schools reported an excess of 93 qualified applicants over capacity while both provincial schools and two Lima schools were in the unenviable situation of having no such excess to choose from.

In 1963 there were 9500 female students enrolled in the last year of secondary school studies. In the following year 14 percent (1352) of these young women applied for nursing training, 3.4 percent (322) were accepted, and about 44 percent took the entrance exams for university studies. While criteria do not exist to determine whether nursing attracts more or less than its "fair share" of the pool of female secondary school graduates, there does not seem to be any basis to fear an imminent limitation in the supply of candidates for nursing training. According to National Planning Institute estimates, the average annual increase in the graduating secondary school class will exceed 5000 during the period 1964-70.<sup>24</sup> Based on this projection,

the 690 entrants required by the 17 nursing schools in 1970 (assuming maximum intake) will represent only about 2.9 percent of the 24,000 female secondary school graduates estimated for that year. However, if nursing school capacity expands much beyond the new schools already scheduled, the number of qualified applicants may become inadequate. For this reason and the others already cited, the advantages of encouraging more men into the profession should not be overlooked.

Although the total number of potential applicants may be sufficient, measures should be taken to ensure that they are adequately distributed among the several schools. Communities the size of Tacna and Tarma are too small to provide an adequate supply of qualified nursing applicants from the local population alone, and as new schools are opened in the principal cities of these regions, their already limited applicant supply will be reduced even more.

Repetition of Studies and Dropouts. During the period 1960-64, less than two percent of enrolled nursing students were repeating a year of study. The policy of most nursing schools is to discourage or not allow marginal students to repeat, preferring instead to eliminate them from further studies. Unless there is a change of school policy, the repetition of nursing studies does not significantly retard the output of nurses.

Approximately 15 percent of the students entering in the two-year period 1961-62 failed to graduate three years later. This dropout rate compares closely with the weighted overall average of 16 percent attrition anticipated by nursing school directors for the class

entering in 1965.

In projecting future output a 15 percent rate is assumed for the three-year schools and a 20 percent rate for the four- and five-year schools. Since these rates compare very favorably with those found in many other countries (e.g., United States, 30% dropout rate) it appears unlikely that they can be reduced much further.

Teaching Personnel. The most critical weakness noted by the Permanent Committee for the Control of Schools of Nursing in its 1962-63 evaluation of nursing education was with respect to teaching personnel.

"Very few schools have taken measures to train teaching personnel; some have taken recent graduates as faculty, without giving them appropriate orientation or without maintaining a proper relationship between the number of students and instructors. There are schools with almost 100 students and only three instructors. With a recommended ratio of one instructor for each six students, there is a 75.5 percent deficit of instructors, one of the factors producing this deficit being the low salaries offered."<sup>25</sup>

The schools, for their part, have claimed they were too short of staff to be able to fully avail themselves of the opportunity to give their instructors further training at the Institute of Postgraduate Nursing (Instituto de Postgraduados de Enfermeria) in Lima. With the faculty shortage now aggravated by the opening of the new schools, it is important to assess the situation nationally so that training goals

may be set. The results of the nursing school survey are useful in giving a first approximation of these needs.

The situation found in 1964 at the ten schools, expressed both in terms of number of positions and in full-time equivalent (F.T.E.) positions, is summarized in Table 5-5.

Table 5-5. OCCUPIED, VACANT, AND DESIRED TEACHING POSITIONS:  
Peruvian Schools of Nursing, 1964

| TEACHING POSITIONS  | NUMBER     | FULL-TIME EQUIVALENTS |            |
|---------------------|------------|-----------------------|------------|
|                     |            | No.                   | %          |
| Occupied            | 312        | 121                   | 76         |
| Vacant (all nurses) | 22         | 18                    | 11         |
| Additional desired  | 21         | 21                    | 13         |
| <b>TOTAL</b>        | <b>355</b> | <b>160</b>            | <b>100</b> |

Dividing the 791 students enrolled by the 121 F.T.E. instructors employed gives a ratio of 6.5 students per instructor, although the ratios found at different schools vary more than threefold. Repeating the calculation based on the desired total of 160 F.T.E. instructors, the ratio would be improved by 25 percent to 4.9 students per instructor. If only nurse instructors are considered (i.e., excluding physicians, etc.), the actual and desired ratios are 7.7 and 6.7, respectively.

In the final report of a survey conducted in 1959 by the Pan American Health Organization of the Latin American nursing schools it was noted that at a recent seminar of nursing school directors there was a general agreement that one instructor per ten students

was an acceptable ratio.<sup>26</sup> With nine of Peru's ten schools meeting or exceeding this standard in 1964, and five exceeding the standard of six students per instructor adopted by the Permanent Committee, it can be asked whether the alleged shortage of instructors is more apparent than real. For several reasons this is probably not the case. First, in most of the hospital schools nursing instructors are expected to spend a considerable proportion of their time rendering services, and hence the total amount of effective teaching time is reduced considerably.

Another factor of importance is the small size of most of the Peruvian schools. Even a small school requires a certain minimum number of instructors to ensure adequate instruction in all disciplines, and within a considerable range of class size these requirements do not increase as more students are added to the enrollment. A number of nursing school directors in Peru are of the opinion that they could operate more efficiently with an enrollment of 40 to 50 students per class which could justify hiring the additional instructors that they already consider necessary for classes only about half that size. If collectively the ten schools had about 1500 students in the three years of study (an average of 50 per class), then even with the desired total of 160 full-time equivalent instructors they would have a ratio approximately equal to that recommended in the nursing seminar.

Considerable progress has been made in recent years in reducing dependence on part-time instructors. By 1964 such personnel accounted for only 11 percent of the total teaching time, although they amounted

to 57 percent of all instructors employed by nursing schools.

More difficult has been the replacement of physicians and other health professionals with nurses. At the time of survey approximately 28 percent of the teaching time was contributed by non-nursing personnel and at three schools, it exceeded one-third.

For purposes of estimating the number of additional instructors required by the new and existing schools of nursing, the following assumptions can be made:

- (1) That all of the vacant and desired positions reported by the nursing schools in 1964 will be filled by 1973.
- (2) That each of the seven new schools assumed to be in full operation by 1973 will have ten full-time nurse instructors in the three clinical years (6:1 ratio), for a total of 70.

Based on these assumptions, the 1973 provisional target for additional trained nurse-instructors is approximately 110, without counting the educational needs of the 31 nurse-instructors lacking postgraduate training in 1964 or the replacements for those lost during the period 1964-73. Correcting for these two factors brings the total number requiring postgraduate training by 1973 to approximately 150.

This target is probably attainable if existing plans for training nurse instructors are fully implemented. These include the annual preparation of up to 20 nurses each in nursing education, public health, and administration at the School of Public Health in Lima and the provision of 11 study fellowships for senior nurse educators

to be provided by the Pan American Health Organization. However, attainment of training objectives for nursing faculty will leave little reserve for training nurse specialists for the nation's service institutions.

The Cost of Nursing Education. In the 1959 survey of Latin American nursing schools, already cited, inter-school comparison of the cost of nursing education proved particularly difficult: some schools had no budget; there was no uniformity of criteria concerning the allocation of costs to education, to maintenance, or to service; and there was no satisfactory way to compare the cost of living in one country with that in another. Of these difficulties, only the last did not exist in the survey of Peruvian nursing schools. Although inter-school comparison among the Peruvian schools is not meaningful, the combined 1964 data for the eight schools providing information (excluding Empleado and Tarma) gives some appreciation of the gross expenditures for nursing education (the value of students' services is not considered). This information is given below:

|  |                           |
|--|---------------------------|
| Combined budgets                             | S/. 7,960,000 (\$297,000) |
| Cost per student-year                        | S/. 11,900 (\$440)        |
| Cost per graduate (assuming<br>15% dropouts) | S/. 38,900 (\$1,450)      |
| Maximum student-year cost                    | S/. 22,600 (\$840)        |
| Minimum student-year cost                    | S/. 1,100 (\$40)          |

In order to develop a rough approximation of what a three-year nursing education should cost, the two model nursing schools described in Table 5-6 can be hypothesized.

Table 5-6. ASSUMPTIONS USED TO ESTIMATE THE COST OF SMALL AND LARGE NURSING SCHOOLS: Peru

| ITEM   | SMALL SCHOOL                           | LARGE SCHOOL                           |
|--|--|--|
| Graduates per year   | 25                                     | 50                                     |
| <u>Teaching staff (F.T.E.'s)</u>                                     |  |  |
| Nurses (S/. 4,000/month)   | 10                                     | 15                                     |
| Non-nurses (S/. 6,000/month)   | 2                                      | 3                                      |
| Students per nurse-instructor  | 8                                      | 10                                     |
| <u>Cost per graduate</u>   |  |  |
| For teaching salaries<br>(1964 average = S/. 12,400)                 | S/. 25,000                             | S/. 19,000                             |
| For administration, room and<br>board (1964 average =<br>S/. 26,500) | S/. 32,000                             | S/. 30,000                             |
| <b>TOTAL</b>   | <b>S/. 57,000</b><br><b>(\$ 2,100)</b> | <b>S/. 49,000</b><br><b>(\$ 1,800)</b> |

These models, although very simplified and approximate, suggest that nursing education should cost about \$2000, or roughly a third higher than was the estimated average for the eight Peruvian schools. This finding is substantiated by the observation made in the report of the 1959 survey of Latin American schools of nursing that several good schools averaged less than \$2500 per graduate.<sup>27</sup> It is also of interest to note that the two Peruvian schools generally conceded to have the best educational programs reported expenditures in 1964 of approximately \$2000 per graduate.

It is evident, however, that without better standards for the

staffing of nursing schools and the allocation of costs, no final judgment can be made of the adequacy of expenditures made for nursing education in Peru. By constructing model budgets and teaching staffs for several different types and sizes of nursing schools, the Permanent Committee for the Control of Nursing Education could help school directors to maximize the return on expenditures.

Physical Facilities. In the aggregate the nursing schools reported serious problems only with respect to laboratory and dormitory facilities. According to estimates made by the schools, laboratory space was adequate for only 19 percent of the programmed enrollment and equipment, for 10 percent. Dormitory space and equipment were adequate for only about 72 percent of the enrollment, despite the fact that almost no students were living at home at the time of survey.

While investment in laboratory space and equipment should receive immediate attention, the priority that should be given to improving accommodations is less clear. Most schools believe they should have complete control over the moral and intellectual environment of the student. However, requiring that all students be resident reduces the number that can be trained. It was seen in the preceding section that approximately two-thirds of the cost of nursing education is for room and board. If students with a satisfactory home situation near to the school were allowed to live out, at least after the first year of study, the schools would be in a much better position to improve educational standards and increase enrollment. The policy of allowing only live-in students should be carefully evaluated

in terms of the pressing need for more nurses.

The adequacy of hospital facilities was not similarly quantified, though all schools considered them adequate for present enrollment and seven indicated that additional students could be accepted without difficulty.

### Future Supply

Table 5-7 gives the output projections for Peruvian nursing schools and summarizes the planning assumptions used.

Table 5-7. OUTPUT OF PERUVIAN SCHOOLS OF NURSING; PLANNING ASSUMPTIONS USED: 1964-83

| TYPE AND NUMBER OF SCHOOLS | DECADE  | ENTRANTS <sup>a</sup> | ATTRITION (%) | GRADUATES |
|----------------------------|---------|-----------------------|---------------|-----------|
| Diploma<br>(10 schools)    | 1964-73 | 315                   | 15            | 2510      |
|                            | 1974-83 | 410                   | 15            | 3480      |
| University<br>(7 schools)  | 1964-73 | 160                   | 20            | 520       |
|                            | 1974-83 | 280                   | 20            | 2240      |

<sup>a</sup>For the diploma schools assumptions apply to classes entering from 1967 to 1970, and 1971 to 1980; for the university schools they apply from 1967 to 1969, and 1970 to 1979. Prior to these years the actual enrollment in 1966 was used to project output. Output for the second decade was based on the stated maximum capacity of the diploma schools, assuming adequate financing, and an average entering class of 40 students in the university schools.

The number of foreign degrees validated during each of the three decades from 1934 to 1963 was 43, 77, and 50. Based on this relatively constant inflow from abroad, it is assumed that approximately 50 nurses, trained under their own auspices, will enter Peru during each of the next two decades. An additional 140 nurses are

expected during the first decade only as a result of a program initiated in 1962 by the Papal Nuncio for Lima in which about 20 Peruvians are sent annually for training in American and Canadian schools.

Projections of the supply of active nurses are given in Table 5-8 and compared with the supply in 1951 and 1964.

Table 5-8. SUPPLY OF ACTIVE NURSES: by Alternative Hypothesis of Retention: Peru, 1951,<sup>a</sup> 1964, 1974 and 1984

| YEAR | NUMBER OF NURSES          |                                |
|------|---------------------------|--------------------------------|
|      | Present Retention (I/II ) | Total Potentially Active (III) |
| 1951 | 1026                      | 1800                           |
| 1964 | 3103                      | 4300                           |
| 1974 | 5000                      | 7200                           |
| 1984 | 8500                      | 12000                          |

|      | PERSONS PER NURSE |                          |
|------|-------------------|--------------------------|
|      | Present Retention | Total Potentially Active |
| 1951 | 7900              | 4500                     |
| 1964 | 3600              | 2600                     |
| 1974 | 3100              | 2100                     |
| 1984 | 2500              | 1700                     |

<sup>a</sup>Data from a limited census conducted in 1951 by the Permanent Committee for the Control of Schools of Nursing and the Ministry of Health.

<sup>b</sup>Since observed nurse attrition follows a normal pattern, Hypotheses I and II are the same.

The population-nurse ratio has limited meaning by itself. As will be evident in the chapters on demand, the critical problem in health manpower in Peru is not so much a shortage of personnel, but

an imbalance between the principal types of health workers, notably doctors and nurses. It is therefore of interest to project the 1974 and 1984 doctor-nurse ratio according to Hypothesis II and compare these with the ratio found in 1964 (Table 5-9).

Table 5-9. DOCTOR-NURSE RATIOS: Peru, 1964, 1974 and 1984.

| YEAR | DOCTORS PER NURSE<br>(Hypothesis II) |
|------|--------------------------------------|
| 1964 | 1.7                                  |
| 1974 | 1.8                                  |
| 1984 | 1.5                                  |

The effect of these estimates is to convert an otherwise optimistic forecast of a considerable improvement in nurse supply, to a more pessimistic one. Unless truly heroic measures are adopted to expand nurse output or seek a temporary substitute for nursing personnel, highly trained medical personnel will continue to be inefficiently utilized. The implications of these projections on future manpower policy are discussed more fully in Part III.

## Chapter 6

### PROFESSIONAL MIDWIVES

#### Current Supply

Almost four out of every five Peruvian babies are ushered into the world with the assistance of a midwife. But only one of these four is entrusted to the hands of a midwife trained in asepsis and the other basic elements of modern maternity care. The fetal and maternal loss that results from unskilled maternity care is enormous -- all the more tragic because it could so easily be prevented.

Should the manpower study consider only the supply of, and demand for, trained midwives, or should the untrained empiric<sup>a</sup> also be included? The Planning Office decided that for its purposes the relatively limited utility of data gathered on indigenous midwifery practice and personnel did not justify the considerable effort that would be required to obtain them. Both this chapter and the ones on demand will, therefore, be concerned only with the trained (professional) midwife, though of necessity the uncounted numbers of empirics will assume an important role in shaping the final conclusions.

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<sup>a</sup>The Spanish equivalent of this word -- "empirico(a)" -- is used throughout Latin America when referring to untrained health practitioners, particularly midwives.

The professional midwife in Peru is perplexed to explain what is happening to her profession. She sees everywhere the need to improve and extend maternal care services. She believes that her preparation makes her the logical choice to provide the bulk of these maternity services. But -- paradoxically -- she finds her traditional occupational role being progressively absorbed by the medical and nursing professions. Midwives in private practice, for example, are finding that the limited number of women able to afford private maternity care are increasingly being attended by physicians. From 1958 to 1962 the proportion of home deliveries attended by physicians increased from 4.0 to 8.0 percent, while those attended by trained midwives declined from 14.4 to 11.5 percent. Untrained midwives attended the remaining 81.6 and 80.5 percent, respectively.<sup>28</sup>

Yet, if the midwife considers leaving the uncertainties of private practice for a salaried government position, she often finds herself competing unsuccessfully with the nursing profession. Even for maternity programs many hospital administrators have come to prefer nurses to midwives because -- in their opinion -- the broader training given to the nurse allows her to be utilized with greater flexibility.

The essential problem now facing Peru's midwives is typical of what sooner or later confronts any highly specialized occupational group -- how to adapt to changing circumstances. For the trained midwife the problem is particularly acute since, unlike many other specialists, her skills are substitutable by others, in this case doctors and nurses. Indeed, the findings of the manpower study

suggest that unless prompt action is taken to revitalize the role of the profession, it may soon cease to make an effective contribution to maternal care.

The Census of Midwives. The census of health manpower found 885 professionally active midwives. All were female and only 3.2 percent were foreign graduates.

Comparison of the number licensed in the period 1924-63, corrected for an estimated 64 deaths, with the number found from the same cohort, gives an overall retention rate of only 51 percent for surviving midwives under the age of 60. For several reasons it can be deduced that few active midwives were not enumerated. First, the omission of active physicians was very low, and since the same procedures were used to find practicing midwives, presumably few in active practice were missed. A more substantive verification is obtained by comparing the number of deliveries attended annually by professional midwives in the home (35,000+ in 1962; latest information available), with the estimate derived by dividing the total annual hours worked by midwives in the private sector (250,000 in 1964), by the estimated average number of hours required per delivery (seven hours; see Appendix H for method of estimation). In both cases the number is approximately 35,000, thus suggesting that the census identified most midwives working in the public sector and that they correctly reported their average weekly hours of work.

The median age of active midwives in 1964 was 37, and 90 percent were under the age of 50. The comparatively old age of Peru's

active midwives (the median age for nurses was 31) is due both to the declining output of new graduates since 1953 and the large number of young midwives leaving the profession shortly after graduation. This latter finding, particularly evident when midwives are compared with nurses (Table 6-1), fits with the hypothesis that midwifery does not offer very attractive career opportunities to the young graduate.

Table 6-1. PERCENTAGE OF MIDWIVES AND NURSES REMAINING ACTIVE:  
by Decade of Licensure: Peru, 1964

| DECADE OF<br>LICENSURE | % OF LICENTIATES ACTIVE IN 1964 |        |
|------------------------|---------------------------------|--------|
|                        | Midwives                        | Nurses |
| ALL                    | 48                              | 66     |
| 1914-23                | 19                              | 18     |
| 1924-33                | 27                              | 42     |
| 1934-43                | 50                              | 49     |
| 1944-53                | 54                              | 60     |
| 1954-63                | 50                              | 76     |

If this pattern of early retirement continues in the next two decades the projected output of midwives will barely cover losses and the population-midwife ratio will decline sharply. A study exploring in detail why so many midwives leave practice could have an important role in shaping future policy.

Geographic Distribution. The wide variation between metropolitan Lima and the provinces in the availability of midwifery personnel is shown in Table 6-2.

Table 6-2. NUMBER OF ACTIVE MIDWIVES AND POPULATION-MIDWIFE RATIOS: by Population Group: Peru, 1964.

| ITEM                | POPULATION GROUP |             |                |               |               |              |
|---------------------|------------------|-------------|----------------|---------------|---------------|--------------|
|                     | PERU             | Metro. Lima | 50,000-250,000 | 25,000-49,999 | 10,000-24,999 | Under 10,000 |
| Active midwives     | 885              | 545         | 92             | 35            | 116           | 97           |
| Persons per midwife | 12,800           | 4,000       | 9,600          | 8,400         | 8,000         | 72,300       |

In only 10 of Peru's 24 departments was the midwife-population ratio better than one per 20,000 and in 8 departments there was less than one midwife per 50,000 inhabitants (Appendix E). The Department of Lima had the best ratio with one per 4400.

Characteristics of Employment. The distribution of the salaried midwives enumerated is shown in Table 6-3.

Table 6-3. DISTRIBUTION OF SALARIED MIDWIVES; AVERAGE HOURS WORKED PER WEEK; MIDWIVES PER 100 BEDS: by Employer: Peru, 1964

| EMPLOYER             | % OF MIDWIVES (N=699) | AVERAGE HOURS WORKED PER WEEK | MIDWIVES PER 100 BEDS <sup>a</sup> |
|----------------------|-----------------------|-------------------------------|------------------------------------|
| ALL                  | 100.0                 | 40                            | 2.6                                |
| Ministry of Health   | 48.6                  | 37                            | 3.1                                |
| Employees' Ins.      | 15.3                  | 42                            | 7.1                                |
| Workers' Ins.        | 10.7                  | 42                            | 3.5                                |
| Armed & Police       | 5.3                   | 34                            | 1.1                                |
| Charity institutions | 8.2                   | 53                            | 0.9                                |
| Private institutions | 11.9                  | 47                            | 3.7                                |

<sup>a</sup>Based on the 614 midwives working in hospitals.

The national average of a 40-hour week indicates that the great majority of salaried midwives were employed on a full-time basis.

Both the Ministry of Health and the armed and police forces utilized approximately one-third of their midwives in non-hospital facilities, such as medical and health posts, though nationally, 84 percent of the salaried midwives worked in a hospital.

The demand for hospital-based midwives varies widely depending on hospital type, the age and sex characteristics of persons eligible for care, and the extent to which nursing personnel are used in maternity services. The number of midwives employed per 100 beds in each health system does, however, show the tremendous concentration of this personnel in the social insurance funds, the Employees' Fund utilizing almost eight times as much midwifery time per bed as do the charity hospitals (Table 6-4).

Despite the great interest of the organized profession in preserving private practice, only about 18 percent of the total time reported by midwives was spent in this way. Surprisingly, when analyzed according to community size, the proportion was lowest (9%) for midwives working in Lima. Apparently the ready availability of hospital facilities and physicians in the capital has severely limited the demand for home deliveries by trained midwives. Although more time was spent in private practice in smaller communities, only in cities of 25,000 to 50,000 did it exceed one-third (37%).

The average monthly income estimated for midwives in each of the three major work situations is shown in Table 6-4.

Table 6-4. ESTIMATED AVERAGE MONTHLY INCOME FOR MIDWIVES: by  
Type of Work Situation: Peru, 1964<sup>a</sup>

| WORK SITUATION                     | % OF MIDWIVES<br>IN WORK<br>SITUATION <sup>b</sup> | AVERAGE<br>MONTHLY<br>INCOME |
|------------------------------------|--|------------------------------|
| Salaried job only                  | 64   | S/. 3800                     |
| Salaried job plus private practice | 20   | 6500                         |
| Private practice only              | 16   | 4400                         |

<sup>a</sup>See Appendix H for methodology and assumptions used.

<sup>b</sup>Based on 829 midwives for whom complete information was available.

By applying weighting factors to these three work situations in proportion to the number of midwives in each group, the average (hypothetical) working midwife earned in 1964 about S/. 4400 per month or S/. 53,000 (\$1970) per year.

In comparison, the average monthly income of 3200 soles estimated for professional nurses was considerably lower than the 4400 soles calculated for midwives. If subsequent studies verify this income differential, and if the uncertainties surrounding the future of midwifery can be reduced, it should not prove difficult to attract greater numbers of young women into the profession.

#### Midwifery Education

Organized midwifery training in Peru began in 1826 when students in this discipline were first accepted by the University of San Marcos in Lima. Thirty years later, when the medical school was

given faculty status at San Marcos, the National School of Midwifery was made administratively dependent on the Faculty of Medicine. A second school of nurse-midwifery was opened in 1959 under the Faculty of Sciences at the University of Huamanga in Ayacucho.

At both schools applicants for training are required to have a secondary school degree and satisfactorily pass an entrance examination. At San Marcos the same selection process is used as for applicants to pre-medical studies, this requirement making it difficult to hold successful candidates in midwifery since medicine offers the opportunity of higher status and income. Following admission at San Marcos, students enter directly into midwifery training, which in 1963 consisted of 7254 hours of instruction (approximately 26% theory, 74% practice) spread over a four-year period. The last year of training, known as the "internship" year, is entirely devoted to practice, and was added in 1963 to what was formerly a three-year program of training. On completing the internship, graduates are given the degree of Midwife (Obstetrix).

The program at Ayacucho differs from the one offered at Lima principally in that one year of general university studies is required before students enter into the four-year midwifery program. Excluding night duty and counting only the last four years, the curriculum in 1963 totalled 3485 hours of instruction, 49 percent devoted to theory and the remainder to practice. At its inception the intention of the University of Huamanga was to have two separate schools, one of nursing and the other of midwifery. These schools were soon combined into the present Institute of Midwifery and

Nursing. Largely as a result of this dual origin, the school at Ayacucho has tended to emphasize nursing instruction more than at Lima, and the degree offered is that of Midwife-Nurse (Obstetriz-Enfermera). As of 1966, however, the Ministry of Health had still not given legal recognition to the Ayacucho degree on the grounds that the instruction in nursing was inadequate to qualify graduates in that field.

Midwifery Applicants. During the period 1960-64 the number entering the Lima school declined from a high of 56 in 1960 to a low of only 14 in 1964, and at Ayacucho fluctuated between one and five. For Ayacucho the problem was basically one of lack of applicants, qualified or not, though in Lima the situation was more complex. In 1963 and 1964, the only years for which there was adequate information, more than 200 applied annually for admission to San Marcos. Of the two principal explanations for a low and declining enrollment despite numerous applicants, (1) a deterioration in the quality of midwifery applicants and (2) a more rigorous selection process, the latter possibility was discounted. Since the schools of pharmacy and dentistry also had difficulty in completing their programmed first-year enrollments despite many applicants, it would be important to study this problem in detail. The results could be of great assistance in identifying weaknesses in the Peruvian educational system below the university level or of changing patterns of occupational preference.

Based on the stated intentions of both schools to make greater

efforts to attract qualified candidates, it is assumed they will have a combined annual intake of about 50 students annually for those graduating in the first decade and 60 students annually thereafter. It is evident, however, that the actual number of entrants may be very different depending on the decisions made in the next few years.

In 1964 approximately 15 percent of the enrollment in the Lima school of midwifery were graduate nurses, and a small but unknown number of midwives were enrolled as full-time nursing students. Women with full training in both professions could unquestionably be useful but the requirement of three extra years of study to obtain the second professional degree appears to be an excessive social and personal price to pay for such versatility.<sup>a</sup> The possibility of offering graduate nurses and midwives a short (6-12 months) course in the other specialty at the School of Public Health in Lima could provide a satisfactory solution.

Repetition of Studies and Dropouts. Less than four percent of the students at the Lima school and none of the Ayacucho students were repeating a year in 1964 so this factor is not considered in making supply projections.

Comparison of cohorts of entering and graduating students at San Marcos during the period 1952-63 gives an estimated attrition rate of 33 percent. Information was not available to distinguish

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<sup>a</sup>Ten fully qualified nurse-midwives were identified in the manpower census, four working as general nurses and six as salaried midwives.

new from repeating first year students and hence this loss is somewhat inflated.

Based on this experience, and correcting for a presumed small number of repeating students, it is assumed that approximately 30 percent of those entering training in future years will not complete their studies.

Teaching Personnel. As a prelude to a planned study of all the schools of midwifery in Latin America, the Pan American Health Organization conducted detailed surveys of Peru's two schools of midwifery in 1963.<sup>a</sup> The situation found regarding teaching personnel is summarized in Table 6-5.

Table 6-5. TEACHING PERSONNEL AT MIDWIFERY SCHOOLS: Peru, 1963

| ITEM  | LOCATION OF SCHOOL |          |
|---|--------------------|----------|
|   | Lima               | Ayacucho |
| <u>Number of Instructors</u>                            | 31                 | 18       |
| Doctors   | 20                 | 7        |
| Midwives  | 7                  | 1        |
| Nurse-Midwives  | 4                  | 0        |
| Nurses  | 0                  | 3        |
| Others  | 0                  | 7        |
| No. of full-time equivalent (F.T.E.) instructors        | 4.5                | 3.1      |
| <u>% Teaching time contributed by</u>                   |                    |          |
| Doctors   | 38                 | 77       |
| Midwives  | 34                 | 3        |
| Nurse-Midwives  | 28                 | 0        |
| Nurses  | 0                  | 7        |
| Others  | 0                  | 13       |
| Average number of hours taught per week, per instructor | 10.5               | 5.6      |
| Students enrolled per F.T.E. instructor                 | 32                 | 5        |

<sup>a</sup>The cooperation of Miss Mabel Zapenas, Consultant in Midwifery, of the Pan American Health Organization, is gratefully acknowledged.

Without additional information on the qualifications and activities of the teaching staff, these data are not sufficient to permit an evaluation of the adequacy of the staffing patterns observed at the two schools. However, they do raise certain questions that merit consideration.

Both schools utilized many part-time instructors in 1963 and, in fact, only 3 of the 49 instructors at both schools approached full-time status. The great majority of the faculty averaged between two and four hours per week in teaching. Such a high proportion of part-time personnel makes continuity of instruction difficult to maintain.

Ayacucho, and to a lesser extent Lima, relied heavily on physicians for the education of midwives. In interviews conducted during the health manpower study it was noted that most physician-instructors were not well oriented to the educational needs of their students and that some did not take their teaching responsibilities seriously. The need to put most of the teaching responsibilities in the hands of a limited number of qualified midwives and nurse-midwives was stressed, leaving for physicians only those parts of the curriculum that require their special training.

The marked differences in the student-teacher ratio at the two schools reflect the very low -- and uneconomical -- enrollment at Ayacucho. Although this situation would seem advantageous for the Ayacucho students, such small classes encourage lax academic discipline and substitution of class periods for

teaching hospital -- thus sacrificing theoretical training. Based on its 1963 teaching staff, Ayacucho could have enrolled almost 90 students more and still have a student-instructor ratio no worse than the Lima school.<sup>a</sup>

Doubts were frequently expressed about the academic qualifications of many of the faculty of the two schools. It was stated that most instructors lacked appropriate graduate preparation, either in the specialty they taught, or in educational methods. An important element of a comprehensive effort to improve midwifery education would be a small but intensive postgraduate program for the core teaching staff of the two schools -- particular emphasis to be given to the social and preventive aspects of maternity care.

Chile's recent experience in improving the practice of midwifery has particular relevance for Peru.<sup>29</sup> Faced with many of the same problems that have been described in Peru, the National Health Service, the University of Chile, and the Pan American Health Organization signed a five-year agreement in 1956 to improve the education and utilization of midwives. First priority went to the postgraduate training of midwifery instructors through the use of study fellowships, inservice educational programs, and a six-month postgraduate course in midwifery education. Carried out in concert

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<sup>a</sup>In 1964 Ayacucho reported the equivalent of 8.1 full-time instructors, almost triple the 3.1 employed in 1963. Although the 1964 value probably over-represents the actual teaching time available, it suggests even more strongly than does the 1963 estimate that the school should be closed unless enrollment can be increased and the academic degree recognized by the Ministry of Health.

with other measures such as refresher courses for practicing midwives, the preparation of auxiliary midwifery personnel, and changed patterns of personnel utilization, these efforts have already resulted in substantial improvement in the maternity care available in Chile.

In 1963 there were approximately 32 students for every full-time equivalent instructor at the school in Lima. In judging the adequacy of this ratio, the experience of Chile is again helpful. Before the tripartite agreement was signed, the school of midwifery at Santiago had almost exactly the same student-faculty ratio (34:1) as did the Lima school in 1963 (32:1). Staff was added until the ratio fell to approximately ten students per instructor, this relationship being considered necessary to ensure adequate student supervision. Based on this standard the school at Lima needs to increase its faculty from the 4.5 F.T.E. instructors available in 1963 to approximately 11. An increase of this magnitude will be essential if midwifery education in Peru is to be modernized with more time allotted to nursing, public health, and supervised community experience and less to lectures and hospital care.

The Cost of Midwifery Education. In 1964 the school at Ayacucho reported an operating budget of S/. 634,000, 94 percent of which was allocated for faculty salaries. Dividing this budget by the ten students enrolled in that year gives a student-year cost of S/. 63,400 (\$2365) -- assuming that the cost of the first year of general studies is borne by the university. While it is likely that the amount spent was less than budgeted, the cost per student was obviously excessive due to the low enrollment.

In the same year, the Lima school reported that S/. 589,500 was budgeted for teaching personnel, administrative expenses being borne by the Lima maternity hospital. Assuming the same relation between the total budget and personnel budget as in Ayacucho, the estimated cost per student-year was approximately S/. 5400 (S/. 25,100 or \$930 per graduate, assuming a 30% student attrition).

How adequate is the amount spent per student-year at the Lima school?<sup>a</sup> While standards for answering this question directly are not available, estimates can be made. In 1964 each F.T.E. instructor at San Marcos received a monthly salary of about S/. 9000, this representing an average of the high salaries paid to physicians and the much lower ones paid to nurses and midwives. Assuming that the number of F.T.E. faculty is increased from 4.5 to 11, and that nurses and midwives provide 85 percent of the teaching time, annual salary expenditures would amount to about S/. 786,000. Increasing this by 20 percent to cover administrative costs, materials and supplies would raise the total to S/. 943,000 or S/. 8600 per student year, assuming the 1964 enrollment. Even with this 60 percent increase over the observed 1964 cost, one year of training in midwifery would cost only about one-half as much as a year in pharmacy or dentistry -- a small price to

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<sup>a</sup>The 1964 enrollment at the school at Lima (110 students) probably represents the minimum number that can justify an adequate teaching staff, since below this level a reduction in the number of students would not permit a comparable reduction in faculty. The artificially high student-year cost at Ayacucho is therefore not considered.

pay for the augmented usefulness of a versatile and community-oriented graduate.

Physical Facilities. Facilities at both schools in 1964 were shared with students in other training programs and though some inconvenience was experienced, this did not adversely affect the teaching program. Neither school had plans for construction in the foreseeable future. Midwifery students live at home and hence the schools were not faced with the heavy expense of room and board as at the schools of nursing. If the 1964 policy of limiting enrollment to day students only is continued, existing pre-clinical and clinical teaching facilities can be regarded as adequate for an output of 50-75 graduates annually from the Lima school and 20-30 for Ayacucho.

#### Future Supply

The uncertainties facing both the schools and the midwifery profession in general have already been described. However, for purposes of approximate projection of future output, it is assumed that both schools will continue in operation throughout the two decades, that the Ayacucho graduates will eventually be certified for practice, and that regardless of the nature of the degree, the graduates will be fundamentally midwives, and hence should be treated separately from nurses. No new schools are foreseen. The combined annual intake of the two schools is assumed to be 50 students annually starting in 1967 for those graduating in the decade ending in 1973, and 60 students per year for those finishing in the next decade. Seventy percent of those entering are expected to graduate.

Using these assumptions, and based on actual enrollment in 1966, and graduates for 1964-66, the projected output of midwives is 380 for the period 1964-73 and 450 for the period 1974-83.

The experience of recent years regarding the validation of foreign degrees in midwifery does not provide a reliable basis for estimating the future supply from this source. From 1956 to 1966 a total of 41 midwives validated foreign degrees, 23 in 1962-63 and between 1 and 4 in each of the other years. With vacancies in the national schools, few students will likely seek foreign training in the future. Three validations annually are assumed.

Table 6-6 presents the projected supply of active midwives according to the alternative hypotheses of attrition.

Table 6-6. SUPPLY OF ACTIVE MIDWIVES: by Alternative Hypothesis of Retention: Peru, 1964, 1974 and 1984

| YEAR | NUMBER OF MIDWIVES                     |                                |
|------|--|--------------------------------|
|      | Present Retention (I/II <sup>a</sup> ) | Total Potentially Active (III) |
| 1964 | 885                                    | 1600                           |
| 1974 | 1000                                   | 1800                           |
| 1984 | 1000                                   | 1900                           |
|      | PERSONS                                | PER MIDWIFE                    |
| 1964 | 12800                                  | 7100                           |
| 1974 | 15400                                  | 8500                           |
| 1984 | 20900                                  | 11000                          |

<sup>a</sup>The difference between the two hypotheses does not exceed 30 so they have been combined.

According to these projections the outlook for growth of the profession is poor, indeed. Based on present rates of attrition the two schools of midwifery will barely replace future losses and will be manifestly unable to maintain even the population-midwife ratio observed in 1964. The need for an immediate and detailed review of governmental policy regarding the preparation and use of midwives is clearly evident if the profession is not to disappear. Chapter 11 examines some of the issues that must be faced in such a review as well as alternatives for the future.

Chapter 7

THE SUPPLY OF OTHER CATEGORIES OF HEALTH MANPOWER

Technical and Auxiliary Personnel

Professional health personnel represent a costly investment and all measures possible should be taken to ensure their efficient utilization. In recent years Peru has made a concerted effort to improve health facilities, but relatively little importance has been given to the preparation of adequate numbers of technical and auxiliary personnel. As a result, many hospitals and public health units have only barely literate, untrained auxiliaries available to assist the professional staff. For lack of qualified x-ray technicians, expensive equipment is either inefficiently used or becomes inoperative due to improper handling. In some institutions the lack of laboratory technicians has resulted in the closure of the lab; in others, simple tests are done inaccurately by untrained personnel or costly physicians are hired to do procedures that could be done by personnel of lesser qualifications. In hospital after hospital, the person who spends the most time with the patient, and who is often charged with considerable responsibility for patient treatment, is the poorly qualified, poorly paid, auxiliary nurse.

Training adequate numbers of technicians and auxiliaries will not be easy. Political and financial support for a new medical or

other professional school is much more readily obtained than for training additional subprofessional personnel. Furthermore, many health officials, struggling to stay on top of rapidly increasing costs, are ambivalent about employing qualified technicians and auxiliaries who would surely demand higher salaries than those earned by their untrained predecessors. With Peruvian labor law and unions making it difficult to discharge unproductive employees, greater use of trained technicians and auxiliaries can probably be accomplished only by adding to staffs that are already "bottom-heavy" with large numbers of untrained personnel. Despite such problems, the completion in 1964 of the first phase of the Ministry of Health's regional hospital-health center system has served to sharpen the focus considerably on this nationwide deficit of technicians and auxiliaries, and chances for formulating a constructive policy for the future appear encouraging.

It was not feasible to use the same methods to analyze the supply of technicians and auxiliaries as was possible for professional personnel. Without established criteria for training and certification, attrition rates as a function of time could not be calculated. Furthermore, the short training period required made it unrealistic to project future output over a period as long as ten years or twenty years. Analysis is therefore limited to a brief characterization of the current supply of technical and auxiliary health personnel, and of the training programs available for their preparation. The chapters on demand give estimates of future requirements and suggest the approximate annual output necessary to meet them.

The rationale behind the different categories established for classifying the educational and training status of this level of health manpower warrants mention. The four categories used to assess the adequacy of educational attainment are described below.

| EDUCATIONAL ATTAINMENT<br>CATEGORY                   | SIGNIFICANCE OF<br>CATEGORY  |
|--|--|
| Uncompleted Primary School                           | There is general agreement in both Peru and Latin America <sup>(30)</sup> that no personnel should be trained with less than a completed primary school education. Health personnel in this category are therefore considered as not meeting the minimal educational requirement for employment.               |
| Completed Primary or One<br>Year of Secondary School | Most training programs for auxiliaries seek to limit admission to those with two or more years of secondary school. This group can therefore be considered "marginally acceptable"; the minimal educational standard of a primary education is met but for most occupations additional schooling is desirable. |
| Two to Four Years of<br>Secondary School             | Persons in this group have the minimally desired educational attainment for most auxiliary positions but lack a secondary school degree and hence are ineligible for certain types of technical or other training.   |
| Completed Secondary School<br>or Above               | Meets the minimal requirement for admission to all technical and professional training programs.   |

The problems encountered in assessing the adequacy of subprofessional training were described in Chapter 2. Despite these difficulties, it was believed that the three categories outlined

below would be useful in providing a rough approximation of the amount of formal training received by each occupational group.

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| TRAINING CATEGORY                         | SIGNIFICANCE OF CATEGORY  |
|---|---|
| Less than four weeks of formal training   | Almost all organized courses in Peru have lasted one month or more. Personnel in this category can therefore be considered essentially untrained.   |
| Four to twelve weeks of formal training   | Most training programs offered for technical and auxiliary personnel in the past decade lasted three months or more (13+ weeks) and all courses offered in 1964 were at least this long. Personnel in this intermediate category can thus be considered as having had some training but likely not meeting current minimal standards. |
| Thirteen or more weeks of formal training | This group includes those with presumably enough training to minimally qualify for their job.   |

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Where possible, unorganized on-the-job training programs have been excluded from analysis, though undoubtedly some health workers counted the weeks spent in apprenticeship as part of their formal training. While data of the type described must be considered as very approximate, it does help to (1) show where the need for more training is most urgent and (2) suggest the approximate number of health workers now employed that require further training as a first priority.

Technicians

Less attention has been given to the proper training and utilization of technical personnel than to any other category of health

manpower, including auxiliaries. As of 1964 most technicians lacked formal training, few courses were available to them, and the career of "medical technology" was still in its infancy. Only two categories were sufficiently large to merit analysis, those of laboratory and x-ray technicians.

Laboratory Technicians. Organized courses in laboratory technology have been offered sporadically at a few Peruvian hospitals in order to meet internal needs. As of 1964 it was estimated that the number trained did not exceed 300 with 75 having been trained by the Hospital Obrero (Lima) alone. Most of the rest were trained in short courses offered in the armed and police forces' health services, and occasionally, other public sector institutions.

According to census data there were 592 persons working in laboratory technology in 1964, 57 percent as technicians and 43 percent as auxiliary technicians. About 14 percent of the total were employed in the private sector and 30 percent were male.

The educational attainment and amount of training received by the two levels of laboratory personnel are shown in Table 7-1. Of note is the high proportion with two or more years of secondary school (75% for the two groups combined) and the low proportion (37%) with three months or more of training. Using three months as the crude dividing line between those with minimal training and those without, almost 400 of the approximately 600 persons working in laboratory technology were untrained.

Against this deficit of trained personnel the efforts being made to prepare technicians seem both inadequate and inappropriate. In

Table 7-1: EDUCATIONAL ATTAINMENT AND WEEKS OF TRAINING OF LABORATORY PERSONNEL: Peru, 1964<sup>a</sup>

| EDUCATION AND TRAINING        | LABORATORY PERSONNEL |                 |
|-------------------------------|----------------------|-----------------|
|                               | Technicians (%)      | Auxiliaries (%) |
| <u>Educational Attainment</u> |                      |                 |
| Completed secondary           | 61                   | 39              |
| 2-4 years of secondary        | 21                   | 26              |
| Primary or 1 yr. of secondary | 18                   | 35              |
| <u>Training Status</u>        |                      |                 |
| 13+ weeks                     | 47                   | 23              |
| 4-12 weeks                    | 13                   | 12              |
| Less than 4 weeks             | 40                   | 66              |

<sup>a</sup>In this and succeeding tables, except where otherwise noted, the percentage of non-respondents does not exceed 20, and in most cases is not over 15. The distribution found among respondents is assumed to also apply to non-respondents.

1964 courses were given at only two institutions and were potentially available at two more (Table 7-2).

Table 7-2. COURSES FOR LABORATORY TECHNICIANS: Duration, Frequency, Educational Requirements and Enrollment: Peru, 1964

| INSTITUTION AND YEAR PROGRAM WAS STARTED | COURSE DURATION & FREQUENCY OFFERED | SECONDARY SCHOOL EDUCATION REQUIRED | 1964 ENROLLMENT |
|--|-------------------------------------|-------------------------------------|-----------------|
| Hospital Militar (1960)                  | 1 month (as needed)                 | 2 years plus 2 of experience        | 0               |
| Clinica Anglo-Americana (1961)           | 30 months (Annually)                | Complete                            | 9               |
| Hospital Obrero (1950)                   | 27 months (Altern. years)           | Complete                            | 0 <sup>a</sup>  |
| Univ. Nac. de Ica (1963)                 | 4 years (Annually)                  | Complete                            | 33              |

<sup>a</sup>The Governing Board of the Hospital Obrero tentatively decided in 1964 to terminate the program for reasons of economy. Normally about 24 students would be admitted.

By 1966 the Faculty of Medicine at the University of San Marcos had started a three-year program and similar programs were under consideration by the other two Lima medical schools. Although future output is uncertain, it seems very unlikely that more than 50 technicians will be graduated annually by the end of the 1960's, barely enough to meet the requirements of the new health facilities being opened and certainly not sufficient to allow for upgrading existing personnel.

The issue of quality is as important as quantity. Although the greatest need is for technologists capable of performing accurately a limited variety of basic laboratory procedures, most of the existing

or proposed training programs are designed to prepare a high-level technician over a three- or four-year period. With this amount of training, few students will be content with anything less than a university degree and "professional status",<sup>a</sup> and almost inevitably salaries will have to be increased disproportionately. Besides leading to frustration, disillusionment and a high rate of attrition among graduates, excessively prolonged training will make it much more costly in time and money for the nation to meet its requirements of laboratory personnel. Proposals for a more adequate balance between the conflicting demands of quantity and quality are presented in Chapter 11.

X-ray Technicians. Peru's 267 hospitals and numerous ambulatory care facilities employed only an estimated 233 x-ray technicians and 64 auxiliary technicians in 1964. And to meet the needs of the future, the only organized course for x-ray technicians was a two-year program started in 1961 at the Anglo-American Clinic, with an annual output of two! For no other category of health manpower was the imbalance between training needs and programs so evident.

The level of educational attainment and the training status was almost the same for both technicians and auxiliaries. Combining both groups, 46 percent had completed secondary school, 27 percent had between two and four years of secondary education, and the remaining 27 percent had a completed primary education or one year of secondary.

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<sup>a</sup>By 1966 this had already occurred at Ica; refused a university degree, most students transferred to other disciplines.

As expected, the proportion with three or more months of training was low, only 29 percent. An additional 27 percent reported 4 to 12 weeks of training and 44 percent had less than 4 weeks. In the absence of organized programs for training this type of personnel, most of those reporting a training experience likely had little more than a formalized apprenticeship.

Despite the frequent complaints expressed by hospital administrators during the manpower study about the lack of trained x-ray technicians, as of 1966 no programs had been established beyond the small one at the Anglo-American Clinic.

#### Auxiliary Nursing Personnel

Subsumed under the category "auxiliary nursing personnel" is a wide variety of auxiliaries working in different programs and in jobs that differ considerably in complexity. However, auxiliaries within this category share at least three characteristics in common and hence merit consideration as a single group. The shared characteristics are:

- (1) That they primarily work in direct contact with individuals in the provision of curative and preventive health services
- (2) That they require considerable supervision by professional personnel, usually nurses, and
- (3) That usually they can be adequately trained in about six months and almost never require more than a year.

For long-range manpower planning there is little need to attempt detailed analysis by functional category of this level of personnel

and in fact the differing systems of job classification and nomenclature used in Peru would make such precision impossible. Nevertheless, for purposes of characterizing the current supply of this level of health manpower it is useful to differentiate between four subcategories of auxiliary nursing personnel, viz, auxiliary nurse, nurse aid, enfermero and sanitario.

Auxiliary nurses, forming by far the largest subcategory of auxiliary personnel, are extensively used to render direct nursing services to patients, and, on occasion, to give anesthesia, change dressings, give injections, and provide minor medical care. They are also employed in public health programs, do home visiting, and assist other professionals such as the dentist, social worker, and midwife.

Training programs for auxiliary nurses have varied widely, many hospitals offering little more than inservice orientation while others, notably those of the Ministry of Health, offer pre-service and inservice courses lasting from three to six months in duration. Since 1958 the Ministry of Health has periodically examined and licensed auxiliary nurses with three or more months of formal preparation in either its own program or that of another agency. By the end of 1963 those licensed totalled 1523. Of these, approximately one-third had completed a three-month course of training and the remaining two-thirds a six-month course.

Although the deficit of qualified auxiliary nursing personnel remains great, considerable progress has been made in recent years in increasing the rate of training. In 1962 the Ministry of Health,

through the Training Center and subsequently the School of Public Health, assumed responsibility for promoting and supervising a series of training courses in the Ministry's new regional hospitals. Plans prepared in 1963 called for training a total of 810 auxiliaries by 1966. To the extent possible trainees will be limited to those with two or more years of secondary school and the course duration will be six months. Additional auxiliaries are trained periodically by the social insurance funds and the armed services, though as yet few charity or private hospitals offer courses.

Nurse aides<sup>a</sup> provide many of the same general bedside nursing services as do auxiliary nurses but usually at a somewhat lower level of responsibility. Almost half are employed by the Workers' Fund at close to the same level as the auxiliary nurse while most of the rest work for the Ministry of Health at a level mid-way between the auxiliary and ward service personnel. This group will likely disappear as personnel are either upgraded to the level of auxiliary nurse or reclassified as service employees. Except in the Workers' Fund almost no organized training programs have been open for nurse aides.

Literally, the term "enfermero" means male nurse, though in fact most enfermeros are male auxiliary nurses rather than professional nurses. In analyzing the characteristics of enfermeros only those without a professional nursing degree are considered in this chapter.

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<sup>a</sup>Included in this subcategory are personnel with the following Spanish language designations: ayudante de enfermeria, asistente de enfermeria, barchilon, jardinera de la infancia, ninera, veledora, ayudante de cuna and camillero.

About 80 percent of the more than 600 enfermeros active in 1964 were employed by the armed and police forces and virtually all received their training, whether by means of organized courses or a period of apprenticeship, in this health care system. In hospitals or clinics the functions of the enfermero are similar to those described for the auxiliary nurse; when at isolated rural posts he provides minor medical care and occasional preventive services to the population under his jurisdiction. When assigned to a post the enfermero is subject to periodic medical supervision.

In many countries of the world civilian and military auxiliary personnel have been used to meet the needs of isolated populations for minor medical care and public health services. In Peru the auxiliary used for this purpose has been designated the sanitario. Three types are found, the sanitario in charge of a Ministry of Health post (posta sanitaria), the sanitario auxiliar working in a medical post, and the military sanitario. The duties of the first-named usually include providing minor medical treatment for common diseases, treatment of minor injuries, immunization against communicable diseases, and improving environmental sanitation. The sanitario auxiliar, perhaps better termed an auxiliary nurse, is the principal and often only auxiliary assisting physicians stationed at the smaller medical posts. In the armed forces most sanitarios are trained to serve as medical corpsmen in time of battle, though some work in outpatient clinics or in remote posts to serve the basic health needs of the local military and civilian population.

The army has had the most extensive experience with the training and utilization of sanitarios. Basic training generally consists of three months of study followed by an additional three months for some of the better graduates of the first cycle or for those re-enlisting. Prior to the 1960's much of the effect of this training was blunted by the very limited basic education of many of the individuals recruited into the program, though in recent years the minimum requirements have been raised substantially to at least a completed primary education and in several training programs, two years of secondary school. However, officials at the Ministry of War indicate that it has proved difficult to attract young men with this amount of basic education for training as a sanitario since they consider this career as offering very limited possibilities for advancement. As a result it has been necessary to make the criteria for selection flexible, balancing a small cadre of well-qualified sanitarios who tend to leave military service as soon as their time is up, with a larger number with lesser qualifications and a greater tendency to stay on the job.

While the number of sanitarios required by the armed and police forces remains relatively constant, the Ministry of Health has been gradually increasing the utilization of this type of personnel. Unlike the military, however, the Ministry has had neither a constant policy nor effective minimal requirements with respect to their training, perhaps reflecting the dual attitudes of many health officials towards the sanitario as a person not qualified to meet the health needs of remote populations but nevertheless necessary to give

the impression that these populations are not being neglected. Thus, while many health posts are staffed by sanitarios trained in the army, a considerable number are operated by persons with only on-the-job training or some previous experience working for a physician. With inadequate supplies and only sporadic supervision, it is not surprising that most sanitary posts are thought to contribute little to the health needs of their communities.

A continuing concern of officials both within the Ministry and the military services has been that the sanitario, once free from the control imposed during his employment, might hang out his "shingle" in a remote town and illegally practice medicine. Although the extent of this problem has not been studied in Peru, it has been well documented in some countries that this is indeed what happens. In the Turkey Health Manpower Study, for example, it was found that a large proportion of the more than 40,000 "needlemen" practicing throughout the country as native practitioners are former army medical corpsmen. If this type of personnel is to be used in the future it will be important to make training, supervision, and salary levels commensurate with the responsibilities these health workers are expected to bear. Only in this way can they be maintained under control and out of the private sector.

Information on the number of sanitarios prepared prior to 1964 could be obtained only from the Hospital Militar of Lima. During the period 1958-63, 189 sanitarios were trained at this institution and unofficially it was estimated that approximately 800 were trained in the decade prior to 1958. During the two years, 1964-65, an addi-

tional 89 sanitarios were to be trained. According to these estimates a minimum of approximately 1000 sanitarios have been prepared since the late 1940's.

Table 7-3 shows the number of auxiliary nursing personnel employed in 1964 and the distribution by sector, sex, and type.

Table 7-3. NUMBER OF AUXILIARY NURSING PERSONNEL; PERCENTAGE IN PUBLIC SECTOR; PERCENTAGE MALE: by Personnel Category: Peru, 1964

| PERSONNEL CATEGORY | NUMBER | % IN PUBLIC SECTOR | % MALE |
|--------------------|--------|--------------------|--------|
| ALL                | 9119   | 90                 | 32     |
| Auxiliary nurse    | 6049   | 87                 | 19     |
| Nurse aide         | 1703   | 86                 | 20     |
| Enfermero          | 608    | 90                 | 100    |
| Sanitario          | 759    | 99                 | 96     |

About 81 percent of the nurse auxiliaries and aides worked in hospitals while most of the enfermeros and all of the sanitarios were in ambulatory care facilities. With the public sector employing nine out of every ten auxiliaries, almost the entire responsibility for future training of this personnel must be borne by the government.

The number of auxiliaries employed per professional and per ten hospital beds varied widely among the several health care systems (Table 7-4). It is of interest to note that despite a very favorable auxiliary-bed ratio, the Workers' Fund had as many full-time equivalent doctors and nurses as auxiliaries and the Employees' Fund had even more professionals than auxiliaries. The auxiliary-professional ratio is artificially low in private institutions since most physician

time is contributed by private practitioners and not salaried personnel.

Table 7-4. NUMBER OF AUXILIARY NURSING PERSONNEL PER PROFESSIONAL AND PER TEN HOSPITAL BEDS: by Health Care System: Peru, 1964

| HEALTH CARE SYSTEM   | AUXILIARIES PER           |                                |
|----------------------|---------------------------|--------------------------------|
|                      | Professional <sup>a</sup> | Ten hospital beds <sup>b</sup> |
| ALL                  | 1.4                       | 2.4                            |
| Ministry of Health   | 1.8                       | 2.2                            |
| Employees' Insurance | 0.7                       | 5.8                            |
| Workers' Insurance   | 1.0                       | 3.9                            |
| Armed & Police       | 0.8                       | 1.7                            |
| Charity              | 1.8                       | 1.8                            |
| Private              | 0.2                       | 2.4                            |

<sup>a</sup>Denominator is number of F.T.E. doctors and nurses employed by each health care system.

<sup>b</sup>Hospital-based auxiliaries only in the numerator.

There is relatively little variation among the four groups of auxiliaries in the average level of educational attainment (Table 7-5).

Table 7-5. EDUCATIONAL ATTAINMENT OF AUXILIARY NURSING PERSONNEL: by Personnel Category: Peru, 1964

| PERSONNEL CATEGORY | % OF RESPONDENTS WITH |                        |                        |                    |
|--------------------|-----------------------|------------------------|------------------------|--------------------|
|                    | Incomplete primary    | Primary or 1st of sec. | 2-4 years of secondary | Secondary complete |
| ALL                | 6                     | 53                     | 25                     | 16                 |
| Auxiliary nurse    | 4                     | 49                     | 27                     | 20                 |
| Nurse aide         | 14                    | 53                     | 21                     | 12                 |
| Enfermero          | 6                     | 59                     | 20                     | 15                 |
| Sanitario          | 6                     | 61                     | 22                     | 11                 |

The percentage of Peru's auxiliaries in each of the three training categories is shown in Table 7-6.

**Table 7-6. WEEKS OF FORMAL TRAINING RECEIVED BY AUXILIARY NURSING PERSONNEL: by Personnel Category: Peru, 1964**

| PERSONNEL<br>CATEGORY | % ANSWERING<br>QUESTION | % OF RESPONDENTS WITH |               |                     |
|-----------------------|-------------------------|-----------------------|---------------|---------------------|
|                       |                         | Less than<br>4 weeks  | 4-12<br>weeks | 13 weeks<br>or more |
| ALL                   | 76                      | 57                    | 8             | 35                  |
| Auxiliary nurse       | 76                      | 54                    | 8             | 38                  |
| Nurse aide            | 67                      | 82                    | 6             | 12                  |
| Enfermero             | 70                      | 31                    | 6             | 63                  |
| Sanitario             | 83                      | 52                    | 13            | 35                  |

Assuming that respondents were typical of all the auxiliaries, this means that about 3200 were trained, 700 were of intermediate status, and about 5200 were essentially without training. Of this latter group, about 500 (10%) had not completed their primary education and hence could be considered ineligible for formal training according to present standards.

The relatively high proportion of non-respondents (24%) should be noted. For perhaps half of the non-respondents the reason was they were not interviewed directly; the information was obtained through secondary sources and hence omission did not result in significant bias. For the rest, failure to answer was probably more apt to be associated with lack of training than not, and hence the proportion trained may be somewhat overestimated.

### Environmental Sanitation Personnel

#### Sanitary Engineers

Trained as professionals in a five-year program at the National Engineering University (Lima), sanitary engineers represent a key

resource in the extension and operation of environmental sanitation services throughout the country.

The first nationally trained sanitary engineers were graduated in 1943 and from that time until 1963 a total of 202 were prepared. During the period 1943-59 the output of graduates averaged 6 per year, increasing to 25 per year during the period 1960-63.

In 1964 a total of 83 sanitary engineers were active in the health sector, 29 in the Ministry of Health, 49 in the national and municipal agencies concerned with environmental sanitation, and 4 in other health care systems. The number working in the sector corresponded to about 41 percent of those graduated, the high rate of attrition most likely reflecting the ease with which engineers can obtain a well paid job in the private sector. It would be important to validate this presumed loss and identify the probable causes as a basis for future planning.

Based on the 1963 enrollment of 113 students, a programmed intake gradually increasing to almost 50, and an estimated attrition for entrants of 15 percent, the projected output of new graduates is 225 for the decade 1964-73 and 375 for the following decade.

#### Sanitary Inspectors and Auxiliaries

Assigned to public health units, sanitary inspectors have been used exclusively by the Ministry of Health to promote, implement and supervise environmental sanitation programs in urban communities.

Six-month training courses have been given by the Training Center (now the School of Public Health), and prior to 1964 a total

of 178 were prepared. The failure to create enough new positions in time to absorb the graduates of several courses has resulted in a loss of some sanitary inspectors to other occupations.

In addition the Ministry of Health also utilizes a limited number of auxiliary sanitary inspectors who are involved in the same activities as are sanitary inspectors but at a lower level of responsibility. Training usually consists only of a short period of inservice orientation.

The 1964 census enumerated 143 sanitary inspectors and 35 auxiliary sanitary inspectors. All were employed by the Ministry of Health.

The average educational attainment of sanitary inspectors and auxiliaries was high: 86 percent of the inspectors and 60 percent of the auxiliaries had completed two or more years of secondary school and all but two had a completed primary education.

Three out of four sanitary inspectors reported having received 13 or more weeks of training as compared with 28 percent of the auxiliaries. For both groups combined, those with less than four weeks of training numbered only 36 (20%).

Training schedules drafted in 1963 called for preparing approximately 100 sanitary inspectors per year through 1966 in order to meet the projected Ministry of Health requirement of 520 inspectors. However, the inability of the Ministry to provide additional positions at this rate led the programmed output to be reduced to 36 inspectors in 1964 and comparable numbers in succeeding years.

### Other Health Personnel

#### Social Workers

Social workers have been trained in Peru since 1937 when the Ministry of Health opened a school in Lima. New schools were subsequently opened under diverse auspices in Lima (1956), Ayacucho (1960), Puno (1961) and Arequipa (1963). At all schools applicants must have completed their secondary education and the usual study curriculum lasts four years. Prior to 1964 a total of 361 social workers were awarded degrees and an additional 286 completed most of their academic requirements but left without obtaining a degree, usually because they did not present a thesis.

The census enumerated 141 social workers active in the health sector in 1964, 74 in the Ministry of Health, 10 to 15 in each of the other health care systems except the armed and police forces which had none, and 22 in other, primarily municipal, institutions. Since industry and the Ministries of Education and Agriculture also employ large numbers of social workers, it was not possible to estimate attrition as a function of time.

The schools of social work are under pressure to increase output to the maximum possible, largely as a result of the need for social workers to assist in the programs of land reform. The number of social workers added during the period 1964-73 will probably approach 1000, of which about 600 will have the full degree. Whether the health sector will be able to meet its own requirements from this supply will depend largely on the salaries offered. In 1964 most

social workers employed in health agencies earned from 2500 to 3500 soles per month while industry was paying two and even three times as much. Until private sector demand is satisfied, governmental agencies will likely continue with a high proportion of vacancies.

#### Dieticians and Nutritionists

Formal training in dietetics has been available only at the Hospital Obrero in Lima. Founded in 1947, the three-year program accepts in alternate years up to 30 secondary school graduates. Prior to 1953 a total of 37 dieticians were graduated and in the decade ending in 1963, 102 dieticians, for a total of 139.

Training in nutrition is offered both by the National Institute of Nutrition and the School of Public Health to persons already qualified in dietetics. At both institutions the period of training is variable, lasting from one to more than six months in duration, and is designed to meet specific institutional needs for research and public health nutritionists. As of 1964 the School of Public Health had given advanced training in nutrition to nine dieticians and was planning to give similar preparation to an additional 31 by 1966. The number trained by the Institute could not be obtained.

Of the 139 dieticians graduated prior to 1964, the census found 113 (81%) to be actively employed in dietetics or nutrition. All but eight were working in hospitals. Forty-six were employed by the Workers' Fund, 23 by the Employees' Fund, 18 by the Ministry and the remaining 26 by the other health care systems.

As a result of the 1964 decision by the Governing Board of the Workers' Fund to terminate the Hospital Obrero training program with

the graduation of the 27 second-year students then enrolled, the future output of dieticians is uncertain. The School of Public Health was considering establishing a training program for dieticians under its own control, though as of 1966 a final decision had not been taken.

#### Health Educators

Starting in 1962 health educators have been trained in a one-year course offered first by the Training Center and subsequently the School of Public Health. Requirements for admission include a basic university degree and some of those trained have had a professional degree in one of the health sciences. During the first two years 25 health educators were trained and 14 more were enrolled in 1966. The frequency and enrollment of future courses will depend on projected requirements.

The census found 22 health educators active in 1964, all employed by the Ministry of Health.

**Part II**

**THE DEMAND FOR HEALTH MANPOWER**



Chapter 8

DEMAND ANALYSIS: GENERAL CONSIDERATIONS

Projection of health manpower requirements presupposes that a suitable method exists to determine the demand that the future population of a region or nation will make for health services. Methods in use for this purpose vary markedly from country to country and techniques for combining the merits of each one into a single formula are not available. This chapter considers the advantages and limitations of three approaches to the measurement and projection of demand, and outlines the method used in the Peru study.

Biological Demand

"Biological demand" is the amount and kind of health care required by a population, irrespective of whether such care is sought or can be paid for. The essential logic of this approach can be summarized as follows: (1) if service standards can be set for the optimal management of each disease entity, and (2) if the number of cases of each disease that occur annually in a given population can be estimated, and (3) if the standards of productivity of each type of health worker can be set, then the manpower and other resources required to produce the necessary services can be determined. The classic example of this approach to demand analysis was a study conducted in the United States over thirty years ago by Lee and Jones.<sup>31</sup>

This method of estimating demand, logically very sound since "diseases" are directly translated into the resources necessary to combat them, presents three major problems in application. First, most countries lack sufficiently comprehensive and reliable morbidity data to make planning based on this method realistic.

Second, it is by no means clear what constitutes optimal management for most diseases. If resource needs were estimated by aggregating the service requirements for each and every disease to which man is heir -- as was done in the Lee-Jones study -- the task of setting and revising standards would be formidable. One way to reduce this problem to manageable size would be to develop standards of care only for those conditions readily subject to control. However, if this were done it would leave unresolved the projection of demand for the remaining disease conditions.

But even if these two methodological difficulties could be resolved, would the end results of this approach be useful? Does it help to quantify the biological need for health care if fiscal and human resources are manifestly unable to meet this need? Is it realistic to assume that government has sufficient control over the health sector to ensure that the requisite amount and kind of health services will be produced? And does government have enough control over the consumers of health services to ensure that they will be utilized? Use of the concept of biological demand to translate "people" into "services", and "services" into "manpower" presumes a degree of control over events that does not, in most cases, exist.

It is important at this point to recall that the Latin American

planning method is based in large part on the concept of biological demand. Morbidity is assessed by the use of sampling procedures and standards are developed for the volume and type of services necessary for the major disease entities for which techniques of prevention and cure currently exist. Although this method offers exciting new insights into the interrelationships between disease reduction and resource utilization, the validity of this approach for national manpower planning has yet to be established. The principal obstacle to using this approach is not, however, the lack of proof that it works -- essentially all methods of projecting demand are "unproved". Rather, it is that the planning method has not yet been applied to all of Peru's systems of health care. If manpower shortages are to be avoided, the demand of each of the component parts of the health sector must be considered. When the Latin American planning method is eventually extended to cover the whole public sector, it will be of great interest to derive long-range estimates of manpower requirements and compare the results with those obtained by other, more pragmatic, methodologies.

To say that the concept of biological demand is still of limited relevance to total resource planning is not to downgrade its importance in program planning and setting priorities. Clearly, if a tuberculosis program is to achieve success it must be based on sound epidemiological information in which disease indices are translated into resource requirements. Likewise, if sectoral priorities are to be rationally determined, comparable morbidity and mortality data for different disease groups must be available.

Effective Demand

The "effective demand" for health services is defined as the amount of services actually demanded, regardless of appropriateness or effectiveness. A good example of this approach to demand analysis is the Taiwan health manpower study of 1962-63.<sup>32</sup> A stratified sample of 10,600 families was drawn from the entire island population and interviewed over the course of one year. Demographic, social and economic information was obtained from each family, as well as the number and kind of health services utilized during the month preceding interview. In this way the annual per capita demand for each type of service was determined for different groups of the Taiwanese population classified according to such variables as income, age, education and residence. Using these same groups, models of the 1973 and 1983 Taiwanese population were constructed and the appropriate per capita demand factors multiplied by the number of persons in each stratum in order to estimate the volume of services of each type to be demanded in the target years. The projected demand for services was then converted into the manpower required to produce them.

The principal advantage of this approach to demand analysis is its realism. The fundamental assumption is that each stratum of society will continue to demand essentially the same volume of services, per capita, in a future year as it did in the base year. Since analysis is based on the services actually consumed, the risk of setting excessively expensive or otherwise unrealistic objectives is avoided. This method is therefore suitable to a dynamic nation undergoing rapid changes in real per capita income, in the level of

educational attainment, in the degree of urbanization and in the age structure of the population.

There are important limitations to this approach, however, that preclude its use in all situations. One problem is, of course, cost. In Taiwan, a country of about 11.5 million population, approximately 35 nurses were employed part-time for one year to do the field interviewing. Although undoubtedly survey procedures and data analysis can be further simplified as more experience with this approach is gained, the economics of this type of study will still represent a difficult obstacle for many countries.

The validity of this method depends greatly on the accuracy of population forecasts. Since the projected total demand for services is based on the aggregated demand of each stratum of the national population, stratified according to certain demographic, social and economic characteristics, it is essential that population projections be reliable not only regarding the total number of persons, but also of their characteristics. In many countries, including Peru, such precision is not yet possible.

The advantages of this method are most apparent in countries where the private sector has primary responsibility for health care. Here, the government's role in manpower planning is essentially one of assuring that the manpower available at a future date is appropriate in both quantity and quality to meet the spontaneous demand for services. In essence, the government is active in influencing manpower supply, but passive in shaping demand. This is the Taiwanese situation and hence this approach is valid.

The Peruvian situation presents important differences; at the time of the health manpower study more than half of all health services were provided by the public sector and more than two-thirds of all health workers were in government employ. If government policy in Peru were essentially passive, content to anticipate the nation's growing demand for health services, an analysis of the effective demand might still be the most appropriate approach. However, if government assumes an active role in shaping the demand for health care and the distribution of services, then measurement of only the effective demand may result in underestimating the volume of services required or in distorting their composition. For example, analysis of the effective demand for health care by the Indian population of the Peruvian highlands would likely reveal a moderate utilization of indigenous practitioners and a very low utilization of physicians and hospitals. If government policy is to make services available to Indian communities only to the extent that rising educational and income levels result in the increased consumption of services, then analysis of the effective demand in these areas is of relevance. If, however, government programs are to give special emphasis to the health of the Indian population, then information of this type may be very misleading.

Few governments can be categorized as either completely active or passive when it comes to shaping the demand for health care; governments rarely speak with one voice. In the case of Peru, the Ministry of Health is assuming an ever more conspicuous role as an architect of the demand for health care in which the amount and kind

of services to be made available to the population are determined in substantial measure by technical considerations. In contrast, the charity hospitals, and to a lesser extent the social insurance funds and the armed and police forces' health agencies have traditionally responded in a passive manner to the demands made by their client populations. Although the public sector has both passive and active components, the current trend is clearly towards the assumption of a more active role in shaping demand.

In a sense, any demand projection based on a realistic appraisal of a nation's desire for health services and ability to pay for them is utilizing the concept of effective demand. The essential issue is not so much whether this concept is useful or not in projecting manpower requirements, but instead the level at which it is used. In the case of the Taiwan study, effective demand is measured at the level of the ultimate consumer, i.e., the number and type of services demanded by individuals of given characteristics. In the Peru study, and for reasons already outlined, this level of analysis did not seem indicated. However, used at the level of government as consumer, i.e., the services the public sector believes it can and should purchase for the benefit of the population, the concept of effective demand is of great relevance. This will be discussed further at the conclusion of this Chapter.

#### Population-Manpower Ratios

Adequate terminology does not exist for an approach to demand analysis that might well be termed "empirical demand". What is meant is essentially that manpower planners select a population-manpower

ratio as desirable and use it as a basis for estimating future requirements.

In recent years this method has been used in developed countries such as the United States<sup>33</sup> and Canada<sup>34</sup> to estimate the number of health professionals required by a given target year to maintain the population-manpower ratio existing in the base-year. In some countries, such as Nigeria,<sup>35</sup> where the current ratio is not considered adequate, a standard ratio is adopted, often on empirical grounds, which is then used as a basis for planning.

The most obvious advantage of this approach is its simplicity. In highly developed countries with an apparently satisfactory supply of one or another type of health worker, it is not unreasonable to set as a short-term minimum target the maintenance of existing population-manpower ratios. So many imponderables exist in manpower demand projections that to try and improve this base-line requirement with a complex method of demand analysis may be merely to practice self-delusion.

In many situations, however, population-manpower ratios have serious drawbacks. For example, the fundamental manpower problem of a given country may be more one of inappropriate distribution and utilization than of insufficient quantity. Also, as population composition changes -- young to aging, poor to richer, rural to urban -- so will the appropriate population-manpower ratios. It is easy to overlook such factors when manpower policy is based primarily on maintaining or achieving a specific ratio.

In countries with a manifestly inadequate supply of manpower,

the tendency is often to adopt ratios observed in the more developed countries. Besides being frequently unrealistic, such targets often tend to divert attention away from ways in which existing manpower could be better utilized or substitution of one type of health worker for another in short supply could be accomplished. The creative element of planning is sacrificed to the rigidity of a standard that focuses not on what must be done, but who does it.

The potentially adverse effect of adopting as a national manpower standard the ratio that exists in some selected group of states or localities was well stated by the National Manpower Council (U.S.A.) when it noted that,

"This method of estimating requirements, as well as any of the many variant methods, inevitably yields a shortage of physicians. If one calculated shortage is made good, another will take its place as long as states or localities have different physician to population ratios. Indeed, as the national ratio rises, absolute differences among state ratios may well increase, resulting in an increase in the calculated shortage."<sup>36</sup>

The idealized structure of a country's health manpower supply can be roughly likened to a pyramid in which a relatively small number of highly trained professionals are supported by a larger number of middle-level health workers, which in turn rest on a large base of many trained auxiliaries and other personnel. In many developing countries the health manpower supply assumes more the shape of an hourglass, with relatively abundant high- and low-level manpower and

scarce middle-level manpower. This has occurred for essentially two reasons: First, schools for training nurses, technicians and other types of middle-level personnel have been established in these countries only in recent years, whereas schools in professions such as medicine have been producing graduates over a much longer period of time; Second, in the popular image, the health status of a country is determined, above all else, by the number of doctors available. It is not generally appreciated, even in the health sector, that, within broad limits, the volume and quality of health services produced depends more on the efficiency with which doctors work than on their total number. Hence, in many developing countries, including Peru, much more attention has been focused on increasing the output of costly professionals than on the preparation of middle-level personnel.

Use of population-manpower ratios has generally tended to mask this important problem and in many cases, even aggravate it. Since high-level manpower is most expensive, planning rightly gives highest priority to analyzing the demand for these resources. But in most situations standards and plans for the training of each type of professional are prepared in isolation. The question is asked "How many doctors are necessary to meet the nation's health needs?", and not "How many nurses, technicians, auxiliaries, etc., are necessary to make the nation's doctors optimally effective?" In the chapter on the supply of nurses it was pointed out that the population-nurse ratio in 1984 will be much improved over 1964. However, if no changes are made in nurse output, the relationship between doctors and nurses will remain almost the same. If the empirical approach to manpower planning is not to perpetuate such distortions, inter-personnel ratios

must also be considered and brought into balance.

A Framework for Demand Analysis in Peru

Three approaches to the problem of translating "people" into "manpower requirements" have been described, (1) by means of the intermediary step of estimating a population's biological need for health services, (2) by means of the intermediary step of estimating a population's actual consumption of health services, and (3) by the direct process of using a desired population-manpower ratio. The last approach, particularly if it were tied to a comprehensive government health plan setting forth specific objectives for the number and kinds of health services to be provided, would greatly simplify manpower planning. Usually, however, the only governments that can realistically develop such an overall framework for long-range planning are those with full responsibility for a comprehensive national health service. At the time the health manpower study was undertaken there was no prospect that the Peruvian government would have such responsibilities in the foreseeable future.

What, then, could serve as a basis for projecting manpower demand in Peru? Government policy, as defined by the National Health Plan, 1966-70, extended over too short a period to be useful for manpower planning. Furthermore, the plan included only those activities programmed by the Ministry of Health and not those of the remainder of the public sector. Biological and effective demand presented problems both of measurement and logic. The application of population-manpower ratios, however derived, ran the risk of neglecting certain important aspects of manpower analysis. In the search for alternative ways of

projecting demand, the concept of Rationalized Demand gradually evolved.

As applied to manpower planning, Rationalized Demand can be defined as the disaggregation of as many different components of the demand for health manpower as is realistically possible; the independent projection to the target year of each of these components using the method most applicable in each case; and then the re-aggregation of the component demands in order to obtain the consolidated projection. In a sense, Rationalized Demand can be considered a pragmatic synthesis of elements of the three types of demand already discussed. For example, in a given country the demand for physicians in the malaria eradication program might be based on the biological need for eradication, the demand for private sector physicians on an analysis of effective demand, and for physicians to staff public sector hospitals and ambulatory facilities, on specific staffing norms and targets for the production of services. Even though this process may not always assure greater precision in anticipating the aggregate demand for health manpower than would be possible with a single population-manpower ratio, it should afford health planners and administrators a better appreciation of the interrelationship between different health policies and the demand for manpower.

The concept of Rationalized Demand asks the question: Rationalized for what? If government policy has clearly outlined the type of health system that should evolve in the public sector, then a single model for future demand will suffice. In most countries, including Peru, no such single blueprint exists and hence demand analysis must contemplate a limited number of alternative hypotheses of how health services

may develop in the future. The policy-maker can then examine the consequences of these alternative patterns in order to anticipate the manpower needs of the health policy eventually adopted.

With these considerations as a frame of reference, manpower demand in Peru will be estimated using the following sequence of analysis:

- (1) Current demand. A description is given of the health sector in 1964, including estimates of the amount and kind of services produced, how they were distributed, and the resources consumed by the sector. The actual utilization of health manpower will be compared with a normative model in order to determine where the principal imbalances lie.
- (2) Future demand. Two demand projections are developed. The first is based on a model of sectoral growth developed by the Planning Office and subsequently adopted by the National Planning Institute for use in making long-range sectoral plans. The second projection assumes a more moderate rate of growth, and proportionately greater emphasis on ambulatory care, than are postulated in the first model. Both models assume substantial gains in productivity, improvements in coverage, and in the per capita utilization of services. Standards are developed for staffing public sector programs and the "manpower mix" is improved. Other methods are used to estimate the private sector manpower demand and the requirements of the educational institutions.

With the manpower and fiscal implications of alternative policies of health sector development thus made evident, it then is the responsibility for the policy-maker to decide which alternative more nearly expresses the objectives of the government, to make any necessary modifications in the model of manpower demand, and to take the necessary steps to assure that the manpower supply will be adequate. (1)

This framework for demand projection can only answer some of the questions related to manpower planning. Issues of a more qualitative nature or having to do with types of health workers not amenable to the analysis just described, are discussed separately.

## Chapter 9

### CURRENT DEMAND

Projections of future manpower requirements must, in large measure, be based on past experience. This chapter, within the limits of available data, provides an overview of the sector's activities in 1964, of the services demanded, of the efficiency with which they were produced, of the resources required to produce them, of their distribution, and of the appropriateness of their "mix" in terms of Peruvian conditions.

#### Services

The output of a sector or an industry is usually measured in terms such as the number of units, kilowatt hours, bushels of wheat, etc., produced. Since standards of quality and of measurement are usually made explicit, it is relatively easy to compare the output and efficiency of different producers of the same product. In contrast, the heterogeneity of the services produced by the health sector makes it much more difficult to compare the output of different producers or to know the effect on health of a given consumption of services. In the absence of practical methods to correlate the qualitative and quantitative components of health care, this section, of necessity, must be primarily concerned with "quantity".

The two units of service produced that consume most of the health sector's resources are "physician visits" (to ambulatory patients) and

"hospital discharges". Table 9-1 gives estimates of the volume of these services produced by the public and private sectors in 1964.

Table 9-1. ESTIMATED PHYSICIAN VISITS AND HOSPITAL DISCHARGES PRODUCED: by Sector: Peru, 1964<sup>a</sup>

| SECTOR         | VOLUME OF SERVICES |            |                     |            |
|----------------|--------------------|------------|---------------------|------------|
|                | Physician Visits   |            | Hospital Discharges |            |
|                | No. (000s)         | %          | No. (000s)          | %          |
| Public Sector  | 7,980              | 49         | 328                 | 84         |
| Private Sector | 8,120              | 51         | 62                  | 16         |
| <b>BOTH</b>    | <b>16,100</b>      | <b>100</b> | <b>390</b>          | <b>100</b> |

<sup>a</sup>See Appendix II for sources of data, detailed breakdown by system of health care, and assumptions used to estimate the visits produced by the private sector.

Three questions can be asked about these services: were they efficiently produced; was the relative emphasis given to each one appropriate for Peruvian conditions; and were they of a requisite quality. The remainder of this section examines the first two questions in the light of available evidence. The last one, though unanswerable by quantitative standards, will be considered indirectly in the final two chapters.

Peruvian health officials have frequently commented on what they regard the low productivity of the nation's health care systems. Available data on productivity, though meager, tend to bear this conclusion out. In 1964 the Planning Office did a detailed survey of Ministry of Health facilities, including an accounting of physician time spent providing outpatient care. In this study it was found that

Ministry physicians averaged only about 2.9 consultations per hour, or 64 percent of the established norm of 4.5. The comparable rate for Chilean physicians working in the National Health Service in the same year was 4.0 visits per hour.<sup>37</sup> Similar estimates, based on less detailed studies, place physician productivity in the Employees' Fund and the armed and police forces' system under two visits per hour, in private practice, under three visits per hour, and in the Workers' Fund and the charity system, under four visits per hour.

Hourly productivity estimates are apt to be unreliable due to the uncertainties implicit in estimating the time actually worked and the amount spent with ambulatory patients. A more reliable index, and one which is better suited to international comparisons, is bed productivity. As seen in Table 9-2, the occupancy rate in both sectors in 1964 was considerably below the generally accepted standard of 75 to 85 percent, depending on hospital size. The short-stay bed discharge rate (16) is particularly indicative of Peru's low hospital productivity; by comparison, short-stay beds produced about 26 discharges annually in Chile (1964), 33 discharges in Puerto Rico (1958), and 30 discharges in the United States (1963).

Among the reasons contributing to the present low bed discharge rate are, of course, the advanced disease processes and poor home conditions of many patients that make early discharge unadvisable. Although these factors and the high incidence of tuberculosis make it unlikely the hospital stay will soon equal that found in developed countries, it is imperative that all means to increase bed productivity be utilized. If the overall average of 14 discharges per bed-year could be increased

Table 9-2. SELECTED INDICES OF HOSPITAL BED PRODUCTIVITY: by Sector and Type of Hospital: Peru, 1964

| INDEX AND SECTOR                      | TYPE OF HOSPITAL |            |                        |
|---------------------------------------|------------------|------------|------------------------|
|                                       | Both             | Short-stay | Long-stay <sup>a</sup> |
| <b><u>% Occupancy</u></b>             |                  |            |                        |
| Public sector                         | 70               | 66         | 92                     |
| Private sector <sup>b</sup>           | 49               | 49         | -                      |
| Both                                  | 68               | 64         | 92                     |
| <b><u>Average stay</u></b>            |                  |            |                        |
| Public sector                         | 19               | 15         | 382                    |
| Private sector <sup>b</sup>           | 9                | 9          | -                      |
| Both                                  | 17               | 14         | 382                    |
| <b><u>Discharges per bed-year</u></b> |                  |            |                        |
| Public sector                         | 13               | 16         | 0.9                    |
| Private sector                        | 17               | 17         | -                      |
| Both                                  | 14               | 16         | 0.9                    |

<sup>a</sup> Includes 4117 public sector beds for tuberculosis, leprosy and mental illness. Additional beds are used for tuberculosis in some general hospitals but these could not be separated out.

<sup>b</sup> Bed occupancy is based on the 1963 average length of stay (latest data available). Discharges per bed-year are based on 1964 data.

to the Planning Office target of 20, this would be the equivalent of adding almost 13,000 additional beds operating at the 1964 rate -- a gross capital savings of about four billion soles (\$150 million). Important factors in achieving increased bed productivity are the improvement and rationalization of staff-bed ratios.

Table 9-3 compares the utilization of physician visits and hospital care in Peru, Taiwan and Turkey based on data obtained in the three health manpower studies.

Table 9-3. ESTIMATED UTILIZATION OF PHYSICIAN VISITS AND HOSPITAL CARE: Peru, Taiwan and Turkey

| COUNTRY | YEAR | PHYSICIAN VISITS<br>PER CAPITA | HOSPITAL DISCHARGES<br>PER 1000 |
|---------|------|--------------------------------|---------------------------------|
| Peru    | 1964 | 1.4                            | 35                              |
| Taiwan  | 1962 | 5.0                            | 12                              |
| Turkey  | 1964 | 1.0-1.2                        | 30-40                           |

The finding in Taiwan of a low utilization rate for hospital care and a high rate for physician visits may have great relevance for countries such as Peru and Turkey. In some respects the three countries are quite similar: all have populations of approximately the same age structure; in each case the per capita G.N.P. is below \$350; and all three have approximately one physician per 2000-2500 inhabitants.

Despite these superficial similarities, there are striking differences between them in both the mortality rates and the way physician time is spent. Based on a reliable statistical reporting system, the 1963 death rate in Taiwan was estimated at 7 per thousand and the infant mortality rate at 29 per thousand live births. Although Peruvian and

Turkish data are much less accurate, in both cases the death rate is probably double the Taiwanese rate and the infant mortality rate four to six times as great.

A number of factors may explain the comparatively favorable health indices of the Taiwanese population, among them the good access that rural Taiwanese have to medical care, the generally high nutritional status of the island's population, and the relatively favorable income distribution that exists nationally. Another factor that likely contributes to the difference is the much greater emphasis given to ambulatory care in Taiwan than in Peru or Turkey. In other words, ambulatory care appears to be in large measure substitutable for hospital care. To the extent this substitutability exists, it means a country with limited resources can buy more health by emphasizing high output (in terms of patient contacts), low cost ambulatory care services than by adopting a more traditional balance between in- and outpatient care.

According to this hypothesis, hospital construction in Peru during the next several decades could proceed at a slower pace than in the recent past. Plans for new projects would be based primarily on the need to relieve overcrowded facilities, to improve bed distribution, and to replace inefficient facilities, and not on the achievement of some desired bed-population ratio. By reducing substantially the annual requirement for capital investment this policy would facilitate a more rapid distribution of health personnel to regions without adequate services. The manpower requirements of a health system giving greater emphasis to ambulatory care than is now the case will be considered in the next chapter.

Table 9-4 gives productivity and utilization estimates for the principal non-medical services produced in 1964.

Table 9-4. ESTIMATED PRODUCTIVITY AND UTILIZATION RATES FOR SELECTED NON-MEDICAL SERVICES: by Sector: Peru, 1964<sup>a</sup>

| SECTOR AND SERVICE      | PRODUCTION AND UTILIZATION |                     |                    |
|-------------------------|----------------------------|---------------------|--------------------|
|                         | No. (000s)                 | No. per person-hour | Per 100 population |
| <u>Dental Visit</u>     | (3590)                     | (1.5)               | (32)               |
| Public sector           | 1010                       | 1.4                 | 9                  |
| Private sector          | 2580                       | 1.5                 | 23                 |
| <u>Public Sector</u>    |                            |                     |                    |
| Sanitario visit         | 856                        | 1.2                 | 8                  |
| Auxil. nurse home visit | 142                        | 0.6                 | 1                  |
| Sanitary inspection     | 149                        | 0.6                 | 1                  |
| Immunization            | 3564                       | 8.6                 | 30                 |

<sup>a</sup>Based on data in the Plan Nacional de Salud, 1966-1970 (1964), Salud. Resumen del Diagnostico (1966), and the Plan Sectorial de Salud (1966), of the Planning Office.

<sup>b</sup>Assuming 34,400 hours worked in the private sector per week (census data), times 50 weeks worked per dentist per year, times 1.5 visits per hour.

Concerned about the low productivity of public sector dentists, the Planning Office hopes, by means of improved work organization and staffing ratios, to increase the hourly visits to 2.0 by 1970 and 3.0 by 1985. For sanitary inspectors and home visitors, productivity targets are in each case one visit per hour. No standards have yet been established for sanitarios pending an evaluation of the value of this type of personnel. Immunizer productivity is to be maintained at the 1964 level.

Distribution. By using the estimated productivity of a doctor-hour in each system of health care, and based on the number of hours worked in each of the five urban population groups, a model can be constructed of the approximate utilization rates of doctor visits by population group. As shown in Table 9-5, there is a strong urban-rural gradient, with Lima residents averaging 14 times more visits per capita than residents of small communities.

Table 9-5. ESTIMATED DISTRIBUTION OF PHYSICIAN VISITS AND PERCENTAGE PROVIDED BY THE PUBLIC SECTOR: by Population Group: Peru, 1964<sup>a</sup>

| POPULATION GROUP  | PHYSICIAN VISITS |            |                    |
|-------------------|------------------|------------|--------------------|
|                   | No. (000s)       | Per capita | % in public sector |
| PERU              | 16,100           | 1.4        | 49                 |
| Metropolitan Lima | 9,610            | 4.1        | 47                 |
| 50,000-249,999    | 2,540            | 3.0        | 50                 |
| 25,000-49,999     | 680              | 2.9        | 43                 |
| 10,000-24,999     | 1,820            | 2.2        | 51                 |
| Under 10,000      | 1,450            | 0.3        | 58                 |

<sup>a</sup>Based on the proximity of the several population groups to Lima, it is assumed that 8% of the visits provided in Lima actually went to residents of smaller communities (i.e., districts of 50,000+, 1%; of 25,000+, 2%; of 10,000+, 2%; under 10,000, 3%). Denominator populations used include both the urban and rural residents of districts in each category.

Without knowing the approximate size of hospital service areas under differing circumstances it was not practicable to estimate the urban-rural gradient in the demand for hospital care. It is interesting, however, that among communities of 10,000+ population, there is little variation in the bed-population ratio (Table 9-6).

Table 9-6. DISTRIBUTION OF HOSPITALS AND HOSPITAL BEDS; BEDS PER THOUSAND POPULATION: by Population Group: Peru, 1964

| POPULATION GROUP  | HOSPITALS | % OF BEDS (N=27,597) | BEDS PER 1000 |
|-------------------|-----------|----------------------|---------------|
| PERU              | 267       | 100                  | 2.4           |
| Metropolitan Lima | 70        | 44                   | 5.6           |
| 50,000-249,999    | 30        | 19                   | 6.1           |
| 25,000-49,999     | 15        | 5                    | 4.7           |
| 10,000-24,999     | 47        | 17                   | 4.9           |
| Under 10,000      | 105       | 15                   | 0.6           |

In actual fact, there is probably a substantial urban-rural gradient in the annual number of discharges per thousand since small town hospitals usually have a much lower bed turnover rate than do hospitals in larger urban centers.

The results of a sampling of records of patients attending the 478-bed general hospital "Antonio Loreno" in Cuzco give some indication of the degree to which rural residents may utilize urban facilities. As shown in Table 9-7, when patients are classified according to residence, in both 1955 and 1963 approximately one-third of those hospitalized were from outside of the city of Cuzco.

Table 9-7. DISTRIBUTION BY RESIDENCE OF PATIENTS HOSPITALIZED AT THE ANTONIO LORENO HOSPITAL: Cuzco, 1955 and 1963

| RESIDENCE                            | % OF PATIENTS, BY YEAR |               |
|--------------------------------------|------------------------|---------------|
|                                      | 1955 (N=6381)          | 1963 (N=7028) |
| <u>Province of Cuzco<sup>a</sup></u> |                        |               |
| Urban                                | 66                     | 65            |
| Rural                                | 4                      | 2             |
| Rest of Department of Cuzco          | 28                     | 31            |
| Outside of Department                | 2                      | 2             |

<sup>a</sup>Urban residents of the Province of Cuzco had about three times as many discharges (per population) at this hospital in 1963 as did rural residents of the same province.

The finding that one-third of the hospitalized patients came from outside of the city is not surprising; for most residents of the department the city of Cuzco is the best source of medical facilities. That an even higher proportion of the ambulatory patients should come from outside of the city was quite unexpected. As Table 9-8 shows, more than two of every five patients treated in the outpatient department in 1963 came from outside of the city of Cuzco and a surprising 38 percent from outside of the Province.

Table 9-8. NUMBER AND DISTRIBUTION OF AMBULATORY PATIENTS ATTENDED AT THE ANTONIO LORENO HOSPITAL: by Type of Service and Residence: Cuzco, 1963<sup>a</sup>

| SERVICE            | % DISTRIBUTION BY SERVICE (N=34,671) | % DISTRIBUTION BY RESIDENCE |                            |                           |
|--------------------|--------------------------------------|-----------------------------|----------------------------|---------------------------|
|                    |                                      | City of Cuzco               | Cuzco Province (exc. city) | Outside of Cuzco Province |
| ALL                | 100                                  | 57                          | 5                          | 38                        |
| Medicine           | 31                                   | 53                          | 4                          | 43                        |
| Emergency          | 30                                   | 63                          | 5                          | 32                        |
| Surgery            | 12                                   | 49                          | 5                          | 46                        |
| Pediatrics         | 10                                   | 65                          | 4                          | 31                        |
| Dentistry          | 9                                    | 52                          | 8                          | 40                        |
| Ear, nose & throat | 5                                    | 63                          | 5                          | 32                        |
| Ophthalmology      | 3                                    | 56                          | 4                          | 40                        |

<sup>a</sup>Comparable data not available for 1955. Urban residents of the Province of Cuzco received 1.3 times as many services, per capita, at this hospital as did rural residents.

The findings cannot be widely generalized. The Department of Cuzco is heavily populated but most of the population is rural and has little access to medical services locally. Nevertheless, the experience of the Antonio Loreno hospital indicates the wide radius of influence such

a facility may have, even in regions where educational and economic levels are low.

The utility of information on the effective radius of action for different types of facilities should not be overlooked. Data obtained inexpensively from further studies of the type done at this hospital, could help planners ensure that new health programs are well utilized, and have a maximum outreach.

#### Demand for Care by Insured Persons

How would the demand for health services be affected if the coverage of the two insurance funds were to be extended partially or to the entire population? How fast could such a policy be implemented? What would be the manpower requirements and cost? With pressures developing both within the funds and without for expanded coverage, the success or failure of future health policy will depend in large part on the government's ability to answer such questions.

Because of the relevance of these questions to manpower policy, the Planning Office requested data from the insurance funds on the per capita utilization rates of certain types of health services for different segments of the insured population. The lack of a denominator, or "population at risk", made utilization data from Ministry facilities unusable, and the high cost of field surveys precluded using this technique on a national scale. By knowing the number of insured according to certain defined characteristics such as age, sex, location of residence, and perhaps occupational classification, it was hoped to develop a model useful for projecting demand according to alternative hypotheses of how the insurance funds might expand.

Unfortunately, it did not prove possible to obtain the requisite data. One problem was secrecy: both funds were unwilling to release sufficient information on utilization and the number of insured to permit an analysis of the determinants of demand and how demand has changed over time. Periodically subjected to attacks by members of Congress and the press alleging wasteful expenditures, excessive salaries, and other abuses, the tendency has been to limit statistical information to only the total output of services and the overall budget classifications.<sup>a</sup>

But even in the few published reports available it was evident that the statistics could not withstand detailed analysis. Problems encountered by the Workers' Fund in the collection of the weekly insurance deductions have resulted in a substantial underestimation of the insured population. Data available from the Employees' Fund made no distinction between services provided to insured employees and to wives eligible for maternity benefits, making it necessary to impute different weighting factors to the two groups in order to derive the base population. In neither fund was it possible to estimate utilization rates on other than a national basis. These and other methodological problems are discussed in Appendix J.

Table 9-9 gives utilization estimates for insured Peruvian employees and workers, and roughly analogous American populations.

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<sup>a</sup>By 1966 both funds were actively collaborating with the Planning Office and the problems encountered in 1963-64 had essentially disappeared.

Table 9-9. ESTIMATED DEMAND FOR PHYSICIAN VISITS AND HOSPITAL CARE BY INSURED EMPLOYEES AND WORKERS, AND AMERICAN ANALOGS<sup>a</sup>

| ITEM                         | "EMPLOYEES" |        | "WORKERS" |        |
|------------------------------|-------------|--------|-----------|--------|
|                              | Peru        | U.S.A. | Peru      | U.S.A. |
| Physician visits (p.c.)      | 2.6         | 4.2    | 3.5       | 3.4    |
| Discharges per 100           | 8.3         | 8.8    | 9.4       | 10.8   |
| Hospital days (p.c.)         | 1.1         | 0.7    | 1.5       | 1.3    |
| Average hospital stay (days) | 13.5        | 8.4    | 19.4      | 12.1   |

<sup>a</sup>See Appendix J for data limitations and assumptions used. Peruvian data are for 1960-64 and the rates are adjusted for estimated errors in the denominator (insured) populations. American data correspond to 1958-60 (hospitals) and 1963-64 (physician visits).

While recognizing the limitations in the Peruvian data, certain tentative conclusions seem warranted. The considerably lower per capita demand for physician visits (including reimbursed private sector visits) by Peruvian employees as compared with workers is unexpected and merits confirmation. The most plausible explanation is that workers are more frequently ill than employees and hence make more visits to the doctor once the financial barrier to such services is removed. The pattern observed in Peru also suggests that a population's social and economic characteristics may not be as important in determining the demand for care as is usually thought. It has been argued, for example, that extending social insurance coverage to populations with a low educational level will not greatly increase demand because these groups are not yet sufficiently conscious of the benefits of health services to utilize them in quantity. If further study proves this hypothesis false it would be especially important to plan carefully before extending coverage to population groups, such as agricultural workers, with high morbidity rates.

The finding that insured employees and workers demand less physician visits, per capita, than does the average Lima resident (2.6 and 3.5 visits for insured employees and workers, respectively, as compared with 4.1 visits) was unexpected.<sup>a</sup> Several hypotheses might explain the difference:

- (1) Error of estimation. The magnitude of the difference, particularly between insured employees and Lima residents, and the fact that the Lima rate is more likely low than high, makes this hypothesis unlikely as a total explanation.
- (2) Rates calculated for insured persons mask regional differences. The funds did not provide sufficient data to calculate rates for Lima and provincial residents. Therefore, the comparatively low national rates observed for insured persons may actually represent the average of a high Lima rate and lower provincial rate.
- (3) Insured persons may be obtaining services outside of the fund programs. Some fund officials believe this occurs but no confirmatory information is available.
- (4) The difference is a real one and reflects the relatively favorable health status of the insured as compared with the uninsured.

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<sup>a</sup>In Taiwan it was found that adults entitled to health benefits under the government's insurance scheme averaged 9 physician visits per year as compared with 4.8 visits for the general population, age 16 to 50 years. This finding contrasts sharply with the situation found in Peru, based on data supplied by the insurance funds.

Since each hypothesis has differing implications for fund policy regarding the extension of coverage, it will be important to refine estimated utilization rates much more than was possible in the manpower study.

The finding of a higher utilization rate of physician visits by workers as compared with employees is paralleled in the case of hospitalization. The higher proportion of hospitalizations for maternity care in the Employees' Fund (about 40%) than in the Workers' Fund (about 20%) likely explains part of the difference in the average length of hospital stay by persons insured in each of the two funds. When more detailed data are made available it would be important to separate out maternity services and standardize the two insured populations for both age and sex.

It is interesting to compare the utilization rates for insured Peruvian employees and workers with those derived for Americans of roughly the same age, sex, and economic characteristics (relative to American standards). With respect to physician visits, the pattern of utilization is the reverse of that found in Peru. The likely explanation is that whereas neither Peruvian workers nor employees had to pay for physician visits, this is not the case in the United States where most ambulatory medical care is provided by the private sector and health insurance generally does not cover the costs of these services. As a result, the lower income groups in the United States are presumably dissuaded from using as many services per capita as do the more affluent.

The patterns of hospital utilization in both countries are remarkably similar and consistent with what might be expected. Presumably the wide availability of insurance coverage and public hospitals in the United States have tended to make the financial barrier to receiving hospital care less important than in the case of physician visits and as a result the lower income group has a higher rate of hospitalization and spends more days in the hospital per illness.

The experience of only five years does not provide a firm basis for establishing trends in the rate of utilization of health services. Nevertheless, it is of interest to note that during the period the per capita utilization of physician visits and bed-days by insured employees remained stationary. For workers, the utilization rates showed a steady decline during the period, from 3.7 to 3.4 for physician visits and from 1.6 to 1.4 for bed-days, though these changes may well be due to improved estimation of the denominator population.

The overall utilization rates for the two Peruvian insurance funds can do no more than suggest hypotheses about the factors influencing demand. Additional studies must be undertaken to quantify the effects of different variables and to estimate demand among groups not currently insured. By carrying out such studies, the social insurance funds would provide valuable information for the planning of health services to meet future needs.

#### Cost

As part of its diagnosis of the health sector, the Planning Office compiled a historical series of the health expenditures made annually by each agency of the public sector from 1958 to 1964. These data, summarized in Table 9-10, show the extremely rapid growth of the public

sector and the changing participation of the different components within it.

Table 9-10. PUBLIC SECTOR HEALTH EXPENDITURES IN INDEX VALUES; PERCENTAGE FOR OPERATIONS; DISTRIBUTION OF TOTAL OPERATING EXPENDITURES BY SELECTED HEALTH CARE SYSTEMS: by Year: Peru, 1958-64<sup>a</sup>

| YEAR | PUBLIC SECTOR EXPENDITURES<br>(1964=2782 million soles) |                  | % OF OPERATING EXPENDITURES BY <sup>a</sup> |            |         |                  |
|------|---|------------------|---|------------|---------|------------------|
|      | Index Values<br>(1958=100)                              | % for operations | Min. of Health                              | Ins. Funds | Charity | Other government |
| 1958 | 100   | 99               | 35  | 35         | 14      | 16               |
| 1959 | 126   | 94               | 29  | 43         | 11      | 17               |
| 1960 | 147   | 88               | 27  | 45         | 10      | 18               |
| 1961 | 175   | 84               | 29  | 44         | 9       | 17               |
| 1962 | 194   | 90               | 32  | 44         | 8       | 16               |
| 1963 | 231   | 89               | 35  | 44         | 6       | 15               |
| 1964 | 241   | 91               | 36  | 42         | 6       | 16               |

<sup>a</sup>Adapted from Planning Office data. Excludes investments in professional training, water and sewage.

According to these figures, during a period when the population increased 19 percent and the G.N.P., 49 percent, all public sector health expenditures increased 141 percent! It would be unrealistic to expect this growth rate to continue much longer and indeed the annual percentage increases show signs of tapering off.

Also of note are the heavy investments made in new facilities, averaging 10 percent annually, and the abrupt increase in the participation of the insurance funds that occurred in 1959 following the inauguration of the Lima Employees' Fund hospital. Since then the Ministry's share has increased steadily, largely at the expense of the charity system, and by 1964 it exceeded the figure for 1958.

In order to determine approximately how much was being spent on each of the principal health activities, the Planning Office applied the Ministry of Health unit costs to the services provided by the entire health sector. According to this model, 45 percent of all operating expenditures were for hospitalization, 36 percent for physician visits, 6 percent for dental visits, and 13 percent for other services. Public funds paid for an estimated 85 percent of the hospital services, 35 percent of the physician visits, 41 percent of the dental visits, and 100 percent of the other services.<sup>38</sup>

Another method of analysis, described in Appendix K, was used to estimate the total cost of the health sector, including health-related investments. In this model, the number of personnel active in each category is multiplied by the estimated average individual income, and the resulting totals aggregated to obtain the amount spent on personnel. Other techniques and assumptions are used to derive the approximate expenditures on medicines, other operating expenses and investments. The way in which this method is used to test Peru's ability to pay for each alternative manpower projection is described in the next chapter.

According to this method, the total health and health-related expenditures amounted to about 4.0 billion soles (\$149 million in 1964, or 4.2 percent of the G.N.P. (Table 9-11)). Of this amount, public expenditures accounted for about 76 percent, and public funds, about 66 percent, after deducting non-governmental contributions to the insurance funds.

The high proportion (29% or 33% if investments are excluded) of health expenditures allocated to medicines deserves comment. Even

Table 9-11. ESTIMATED COST OF THE HEALTH SECTOR, INCLUDING INVESTMENTS: by Expenditure Category: Peru, 1964<sup>a</sup>

| EXPENDITURE<br>CATEGORY     | EXPENDITURES          |                        |            | % OF<br>G.N.P. | % IN<br>PUBLIC<br>SECTOR |
|-----------------------------|-----------------------|------------------------|------------|----------------|--------------------------|
|                             | Mills.<br>of<br>soles | Soles<br>per<br>capita | %          |                |                          |
| <u>Health Care</u>          | (3463)                | (307)                  | (87)       | (3.6)          | (73) <sup>b</sup>        |
| Personnel                   | 1953                  |                        | 49         | 2.0            | -                        |
| Medicines                   | 1160                  |                        | 29         | 1.2            | -                        |
| Other                       | 350                   |                        | 9          | 0.4            | -                        |
| <u>Health investments</u>   | 540)                  | ( 47)                  | (13)       | (0.6)          | (98)                     |
| Prof. training <sup>c</sup> | 130                   |                        | 3          | 0.1            | 92                       |
| Facilities                  | 255                   |                        | 6          | 0.3            | 100                      |
| Water & sewage              | 155                   |                        | 4          | 0.2            | 100                      |
| <b>TOTAL</b>                | <b>4003</b>           | <b>354</b>             | <b>100</b> | <b>4.2</b>     | <b>76</b>                |

<sup>a</sup>Based on data, methodology and assumptions given in Appendix K.

<sup>b</sup>Known public sector expenditures (Table 9-10) as a percentage of estimated total expenditures, excluding investments.

<sup>c</sup>Estimated direct expenditures by professional schools and faculties.

allowing for some overestimation, the amount spent is much higher than the 10 to 20 percent level usually observed in more developed countries.

Similarly high drug expenditures were found in the Taiwan study -- about 25 percent of a total that equalled 5.5% of the G.N.P.

Although confirmatory data are not available, it appears reasonable to expect relatively greater expenditures on drugs in countries at the level of development of Peru and Taiwan. Medicines are cheaper than hospitals and doctors, and with drug distribution largely uncontrolled, private sector consumption is high.

Objective criteria don't exist to determine what is an optimum balance between drug and other health expenditures for a country at Peru's level of development. However, as the percentage of the population employed in the health sector increases from the 1964 level of about 0.4 percent to the 1.0-1.5 percent level found in

developed countries, the amount spent on salaries will go up accordingly. Any measures acting to slow the rise in drug expenditures will help free funds to pay for the new personnel.

### Manpower

Met Demand. The current demand for manpower can be divided into two component parts, met demand and unmet demand. The former, also equal to the supply of active health workers, has already been described in some detail in the chapters on supply. Table 9-12 consolidates these figures for all categories of health manpower, grouped according to approximate level of function.

Table 9-12. ESTIMATED NUMBER AND PERCENTAGE OF FULL-TIME EQUIVALENT PERSONNEL WORKING IN HEALTH; POPULATION PER WORKER: by Sector, Personnel Category, and Type of Activity: Peru, 1964

| PERSONNEL LEVEL             | NUMBER ACTIVE | POPULATION PER WORKER | % FULL-TIME EQUIVALENT PERSONNEL |                |                |
|-----------------------------|---------------|-----------------------|----------------------------------|----------------|----------------|
|                             |               |                       | Services                         |                | Education      |
|                             |               |                       | Public Sector                    | Private Sector |                |
| <u>Professional</u>         |               |                       |                                  |                |                |
| Physicians                  | 5,235         | 2,200                 | 62                               | 31             | 7              |
| Dentists                    | 1,685         | 6,700                 | 29                               | 66             | 5              |
| Pharmacists                 | 1,720         | 6,600                 | 14                               | 84             | 2              |
| Sanit. Engs.                | 83            | 136,100               | 96                               | 1              | 3              |
| Nurses                      | 3,103         | 3,600                 | 89                               | 9              | 2              |
| Midwives                    | 885           | 12,800                | 81                               | 18             | 1              |
| Social Workers              | 141           | 80,100                | 91                               | 9              | 0 <sup>a</sup> |
| Diet. & Nutrit.             | 113           | 100,000               | 90                               | 8              | 2              |
| Health Educ.                | 22            | 513,600               | 100                              | 0              | 0              |
| Other                       | 141           | 30,100                | 98                               | 2              | 0              |
| Subtotal                    | 13,128        | 900                   | 61                               | 35             | 4              |
| <u>Tech. &amp; Auxil.</u>   |               |                       |                                  |                |                |
| Lab. Tech. & Aux.           | 592           | 19,100                | 86                               | 14             | 0              |
| X-ray Tech. & Aux.          | 297           | 38,000                | 87                               | 13             | 0              |
| Other Techs.                | 221           | 51,100                | 94                               | 5              | 1              |
| Aux. Nurses                 | 9,119         | 1,200                 | 90                               | 10             | 0              |
| Sanit. Insp. & Aux.         | 178           | 63,500                | 100                              | 0              | 0              |
| Subtotal                    | 10,407        | 1,100                 | 90                               | 10             | 0              |
| <u>Admin. &amp; Service</u> |               |                       |                                  |                |                |
| All types                   | 24,100        | 500                   | 82                               | 16             | 2              |
| ALL                         | 47,635        | 240                   | 78                               | 20             | 2              |

<sup>a</sup>Since most social workers go to other sectors, those in education are not counted.

This total, excluding non-professional personnel working in private offices, pharmacies, or the pharmaceutical industry, amounted to about 1.4 percent of the 1964 labor force and 9.1 percent of those employed in "services".

Peru's health manpower profile, in which personnel are grouped by approximate level of training, is in sharp contrast with the one found in the United States (Figure 9-1). Two differences are notable. First, in the United States "supporting personnel" represents only 31 percent of the total as compared with 51 percent in Peru. It is unrealistic, of course, to assume that Peru could soon attain an administrative efficiency comparable to that found in the United States. The enormous potential for economies is nevertheless apparent; assuming no change in the cost of the health sector or in 1964 salaries, each 10 percent reduction in the number of supporting personnel would release sufficient funds to hire about 1200 more health workers at the nurse level.

The second difference has to do with the hierarchical distribution within the upper three personnel categories. In the United States, for each person at the doctoral level there are almost two persons from the allied professions and 1.2 auxiliaries, for an overall ratio of 3.1-to-1. In Peru, where the lack of resources makes it doubly important to maximize the efficiency of high-level manpower, the ratio is only 1.6-to-1. Improvement in this ratio should be a major test of the success of future manpower policies.

Figure 9-1. DISTRIBUTION OF HEALTH MANPOWER: by Level: Peru, 1964, and United States, 1960<sup>a</sup>

| LEVEL   | COUNTRY AND % AT LEVEL |               |
|---|------------------------|---------------|
|   | Peru                   | United States |
| <u>Doctoral</u> <sup>b</sup>                            | (18.4)                 | (16.9)        |
| <u>Allied professional &amp; technical</u> <sup>c</sup> | (11.1)                 | (30.8)        |
| <u>Auxiliary</u> <sup>d</sup>                           | (19.3)                 | (21.0)        |
| <u>Supporting</u> <sup>e</sup>                          | (51.2)                 | (31.3)        |

253 -

<sup>a</sup>Based on Dale Hiestand, "Research into Manpower for Health Needs", Milbank Memorial Fund Quarterly, 44:4 (Oct. 1966, Part 2), Table I, p. 149, citing U.S. Census of Population, 1960, Occupation by Industries, pp. 132-136. Categories selected are approximately comparable for the two countries.

<sup>b</sup>Doctors, dentists and pharmacists.

<sup>c</sup>Nurses, midwives, technicians and dieticians.

<sup>d</sup>Auxiliary nurses, aides and attendants.

<sup>e</sup>Administrative, clerical, service and unskilled labor.

It is of interest to compare the observed hospital staffing patterns in each health care system in 1964 with the standards used to estimate future personnel requirements (Table 9-13). Taking the nine personnel categories together, Peru's hospitals employed less than 60 percent of the personnel considered necessary for efficient operation. Particularly striking is the low utilization of auxiliary nursing personnel. With the nursing shortage acute and difficult to correct in a short period of time, priority must be given to increasing the supply of auxiliary nurses. In this way, and at relatively low cost, the effect of the shortage can be somewhat mitigated. It will also be important to reduce the enormous variation in staffing patterns so that the overall efficiency of the hospital system can be improved. Specific ways in which these objectives can be achieved will be discussed in the concluding chapters.

Table 9-13. PERCENTAGE ATTAINMENT OF STAFFING STANDARDS FOR HOSPITAL-BASED PERSONNEL: by Personnel Category and System of Health Care: Peru, 1964<sup>a</sup>

| PERSONNEL      | SURPLUS OR DEFICIT (F.T.E.) | PERCENTAGE ATTAINMENT OF STAFFING STANDARDS FOR HOSPITAL-BASED PERSONNEL |                |            |                    |                 |         |                 |
|----------------|-----------------------------|--|----------------|------------|--------------------|-----------------|---------|-----------------|
|                |                             | All  | Min. of Health | Empl. Ins. | Workers' Insurance | Armed & Police  | Charity | Private         |
| ALL            | -10,050                     | 56   | 55             | 169        | 92                 | 67 <sup>b</sup> | 36      | 46              |
| Physicians     | - 930                       | 70   | 55             | 217        | 135                | 128             | 42      | 41 <sup>c</sup> |
| Dentists       | - 20                        | 87   | 67             | 285        | 106                | 283             | 36      | 65              |
| Pharmacists    | - 50                        | 75   | 50             | 281        | 103                | 196             | 27      | 93              |
| Nurses         | - 2,850                     | 50   | 45             | 203        | 73                 | 111             | 23      | 31              |
| Auxil. Nurses  | - 5,400                     | 53   | 55             | 125        | 80                 | 21 <sup>t</sup> | 41      | 49              |
| Midwives       | + 50                        | 109  | 139            | 438        | 123                | 49              | 43      | 110             |
| Social Workers | - 280                       | 19   | 27             | 44         | 31                 | 0               | 10      | 14              |
| Dieticians     | - 100                       | 49   | 19             | 287        | 187                | 59              | 8       | 31              |
| Technicians    | - 470                       | 53   | 53             | 102        | 127                | 84              | 41      | 19              |

<sup>a</sup>Based on standards given in Appendix II. Adjustment was made for the chronic disease beds in the Ministry of Health and the charity system. Since the hospitals in the several systems vary considerably as regards occupancy rates, the kinds of diseases admitted, the ratio of in- to outpatient care, and average size, all of which influence staff requirements, the figures given in this table should not be interpreted too strictly.

<sup>b</sup>Figures are low due to a selective census omission of auxiliary personnel working in this system. If auxiliaries are excluded, the overall percentage of the staffing standards met rises from 67 to 112 percent.

<sup>c</sup>Includes only salaried physicians. Total physician time spent in private institutions (including those working on a fee-for-service basis) probably exceeds that called for by the standard.

Unmet Demand. An unmet demand for health manpower may be manifest in a variety of ways; disproportionately high incomes, excessive patient loads, prolonged working hours, personnel substitution, a high preference for health careers among students, and a low vacancy rate in budgeted positions. Evidence given in the chapters on supply suggests that in the aggregate, these conditions do not exist in Peru and indeed for some professions, quite the reverse situation prevails.

This does not mean, however, that shortages do not exist under some circumstances. To better document the adequacy of the manpower supply for institutional needs, the Planning Office arranged to determine vacancy rates for budgeted positions at the time of the census. The study was limited to provincial facilities since it was generally agreed that the vacancy rate would be very low in Lima.

The results of the survey proved much less complete than originally expected. Facilities administered by the armed and police forces would not release such information for reasons of national security; other institutions did not cooperate lest such information reflect badly on their ability to provide health services or in some way be used to restrict their personnel policies. Even where officials were cooperative, it was not always possible to know how to interpret the information obtained. For example, in some institutions where the "budgeted positions" exceeded the funds actually available for personnel, administrators were obliged to keep a certain number of positions vacant. In others, notably the charity hospitals, the low salaries offered made it unlikely that these positions could be filled even if the supply of health manpower were considerably greater.

Fifty-three non-military hospitals and hospital-health centers provided information sufficiently complete for analysis, this representing about 39 percent of both the facilities and beds available in the provinces. In no system was less than a fourth of the institutions and a third of the bed capacity studied.

The number and percentage of positions vacant, by type of health worker, is shown in Table 9-14, as well as an estimate of the total number of vacancies in all provincial institutions. Although numerically the greatest shortage is for doctors and general duty nurses, the vacancy rate is greatest, approaching 50 percent, for public health nurses and social workers.

Table 9-14. NUMBER AND PERCENTAGE OF POSITIONS VACANT, AND ESTIMATED TOTAL VACANCIES: by Personnel Category: Peru, May-August, 1964

| PERSONNEL CATEGORY | RESPONDENT INSTITUTIONS |                                | ESTIMATED TOTAL VACANCIES <sup>a</sup> |
|--------------------|-------------------------|--------------------------------|--|
|                    | No. of vacancies        | % of budgeted positions vacant |  |
| Physicians         | 121                     | 17                             | 315                                    |
| Dentists           | 6                       | 5                              | 15                                     |
| Pharmacists        | 5                       | 13                             | 15                                     |
| Nurses (gen.)      | 103                     | 23                             | 230                                    |
| Nurses (P.H.)      | 25                      | 49                             | 55                                     |
| Midwives           | 11                      | 8                              | 30                                     |
| Social workers     | 12                      | 48                             | 30                                     |
| Lab techs.         | 17                      | 20                             | 45                                     |
| X-ray techs.       | 9                       | 15                             | 25                                     |
| Sanit. insp.       | 19                      | 19                             | 40                                     |
| Sanitario          | 33                      | 8                              | 75                                     |
| Dieticians         | 0                       | 0                              | 0                                      |

<sup>a</sup>Obtained by extrapolation of the vacancy rate for each type of health worker in each system of health care, to the rest of the provincial facilities. Vacancies at non-hospital facilities operated by the Ministry of Health have also been taken into account.

For physician vacancies the desired specialty was recorded. Of the 141 vacancies, 102 were for general physicians, 6 for radiologists, 5 for otolaryngologists, 4 for pediatricians, and lesser numbers for each of 14 other specialties. Since respondent institutions represented only about two-fifths of the total, this means that there was an unmet demand for more than 200 general physicians and almost 100 specialists.

The unmet demand for general practitioners is best explained by the reluctance of physicians to work in the provinces. Among certain specialties, however, an additional factor contributing to the unmet demand is the shortage that exists nationally. Even in Lima difficulties were reported in recruiting qualified radiologists, otolaryngologists, pathologists, and ophthalmologists, and to a lesser extent, pediatricians.

A number of administrators suggested that the vacancy rate for nursing personnel was artificially low, since if there were any hope of hiring more nurses, the money to create more positions could be found. Some noted that if part-time employment were allowed, a considerable number of inactive nurses living in the provinces could be attracted back into service. The importance of a study to determine the effect of these and other means for reducing the nursing shortage has already been emphasized.

These findings, based on an unrepresentative sample of Peru's health facilities, can only suggest the current level of unmet manpower demand. However, assuming proper attention were paid to statistical validity, information on vacancy rates could be of great value in manpower planning. Shortages would be promptly identified, quantified, and, based on recent trends, their probable evolution anticipated. An easy way to obtain such

data would be for the Division of Health Statistics to annually conduct a survey of vacancies among a representative panel of health institutions in conjunction with the filing of activity reports. By limiting both the number of institutions surveyed and the frequency of survey, the chances of gaining the necessary cooperation could be maximized.



Chapter 10

FUTURE DEMAND

To improve the health of the Peruvian population efforts must be directed towards (1) increasing the volume of services available per capita, (2) improving the distribution of services among the population, and (3) preferentially emphasizing those activities most apt to improve health. This chapter tests the reasonableness -- measured in resource costs -- of two demand models designed to accomplish these objectives. Chapter 11 considers the implications of the projected demand on health manpower policy.

It must be emphasized at this point that manpower planning is not program planning. For the former, the long period of projection used and the necessity of including the manpower requirements of all agencies and institutions make it impossible to enter into the details of how manpower is to be utilized. If projections were to be based on the number of resources to be allocated to each health problem, by each of the many health institutions, the model of demand would soon become hopelessly complicated, and more important, unrealistic. In program planning these considerations must be taken into account while in manpower planning they can be considered only in the most general of terms. The manpower planner

is concerned with providing the administrator with a reasonable supply of health personnel at some future date consistent with the country's ability to support this personnel and the principal health problems encountered.

The administrator, or program planner, is then concerned with the specifics of how this personnel should be utilized and distributed.

The Demand Model: Objectives and Constraints

The origins of the model used to project manpower requirements can be summarized as follows:

- (1) In 1966 the National Planning Institute asked the Planning Office for alternative proposals of sectoral growth to 1985, assuming no increases in the costs of inputs over the base year.
- (2) In compliance, the Planning Office submitted minimum, intermediate and maximum alternatives based on differing hypotheses concerning hospital construction, resource productivity, and the demand for services. The resource costs of each alternative were estimated using very approximate standards.
- (3) The National Planning Institute adopted the intermediate proposal as the preferential framework for making long-range plans.

The intermediate proposal serves, therefore, as the point of departure for projecting manpower requirements. However, as more detailed estimates were made of the costs of this model, the desirability of certain modifications became apparent. Accordingly, the effects on resource requirements of variations in the model are considered at the conclusion of this chapter.

The service objectives of the model are shown in Table 10-1 and compared with the comparable 1964 estimates. Major gains are postulated in all categories, with relatively more emphasis being given to ambulatory medical services than to hospital care.

Table 10-1. PROJECTED PRODUCTION AND UTILIZATION RATES FOR SELECTED HEALTH SERVICES: Peru, 1984<sup>a</sup>

| SERVICE                     | SERVICES PER 1000 POPULATION |       |                         | VOLUME OF SERVICES<br>in (000s) |        |
|-----------------------------|------------------------------|-------|-------------------------|---------------------------------|--------|
|                             | 1964                         | 1984  | % Increase<br>(1964-84) | 1964                            | 1984   |
| Discharges                  | 35                           | 60    | 71                      | 390                             | 1,255  |
| Doctor visits               | 1,400                        | 3,000 | 114                     | 16,100                          | 63,000 |
| Dentist visits <sup>b</sup> | 320                          | 500   | 56                      | 3,590                           | 10,600 |
| Immunizations <sup>c</sup>  | 300                          | 450   | 50                      | 3,564                           | 9,420  |
|                             | % URBAN POPULATION COVERED   |       | % RURAL POP. COVERED    |                                 |        |
|                             | 1964                         | 1984  | 1964                    | 1984                            |        |
| Potable Water               | 67                           | 100   | 2                       | 45                              |        |
| Sewage                      | 16                           | 100   | 0                       | ?                               |        |

<sup>a</sup>Adapted from the Plan Sectorial de Salud (Dec. 1966), pp. 77 and 90. Estimates have been adjusted from 1985 to 1984.

<sup>b</sup>The original target called for 12.6 million visits. For reasons given in the text this was revised downwards to 10.6 million.

<sup>c</sup>The original target of 13.6 million immunizations (0.65 per capita) was based on estimates of the number of each type required annually by each age group. This standard was subsequently revised downwards to 0.45 immunizations per capita, a figure judged more in accord with the actual needs for such services and the feasibility of providing them.

The model also assumes:

- (1) That the staffing standards developed for the rationalization of public sector manpower shall be fully implemented by the target year;
- (2) That the estimated demand for faculty in the educational institutions shall be met;
- (3) That the 1964 public sector-private sector ratios of hospital beds (6.5:1) and physician time (2:1) shall be maintained.

Although the original model called for maintenance of the 1964 public sector-private sector ratios of dentist and midwife time, this constraint was subsequently abandoned as unrealistic. No limit was placed on the cost of the model since this was to be determined.

The Planning Office considers it important that private sector growth approximately parallel that of the public sector. In part this is based on past experience; during the period 1950-64 private sector beds represented a remarkably constant 11 to 13 percent of the total. It also reflects the hope that a strong private sector will continue to ease the pressure on government programs. In fact, since relatively greater gains are forecast in the productivity of public sector resources, an increasing proportion of the total volume of health services will be provided by the government.

#### Manpower Assumptions

The detailed standards used to estimate most components of the manpower demand are given in Appendix L. The following sections describe the reasoning and assumptions that went into the development of these standards, and the adjustments necessary to complete the model.

Public Sector Institutions. The Planning Office, in collaboration with Ministry of Health personnel, developed normative models for the staffing of general and chronic disease hospitals, medical posts, health posts, and for the provision of selected types of ambulatory services. Total staff requirements were then disaggregated to determine the hours of personnel time needed per "instrument of health policy" (bed-year, doctor-hour in ambulatory care, etc.) and assumptions made of the average output per instrument. These standards were then applied to the number of instruments necessary to produce the desired volume of services. Schematically:

$$\text{Manpower hours required} = \frac{\text{Services required}}{\text{Output per instrument}} \times \text{Manpower hours required per instrument}$$

The total number of hours, by type of health worker, was then divided by the number of hours worked per person per year to determine the number of full-time equivalent personnel needed.

Separate estimates were made of the number of personnel required for the central and regional administration of the public sector health systems, and for the three national institutes.

Educational Institutions. Faculty requirements are based on the expected 1984 enrollments, assuming an expansion of the educational institutions consistent with the projected demand for personnel. The following ratios of F.T.E. faculty per 10 students were used:

| PROFESSION           | F.T.E. FACULTY PER<br>10 STUDENTS |
|----------------------|-----------------------------------|
| Medicine             | 3.1                               |
| Dentistry            | 2.5                               |
| Pharmacy             | 1.5                               |
| Nursing              | 1.4                               |
| Midwifery            | 1.0                               |
| Sanitary Engineering | 1.0                               |

Adjustments were made for the probable number of professionals engaged in teaching students in other than their own discipline and for students enrolled in years of study not likely to be taught by health professionals (e.g., pre-medical studies, first year of university nursing, etc.). Only 60 percent of the required number of medical and dental educators were counted on the assumption that the remaining 40 percent will be included in the standards for service institutions (i.e., that about 40 percent of the faculty time will in fact be devoted to providing services in the teaching hospitals and clinics). The estimated requirements of the School of Public Health were also included.

**Private Sector.** The projected demand for salaried personnel in private institutions is based on the 1964 staff-bed ratio, modified to account for changes likely to occur in the 1964-84 period (Appendix E)..

These ratios were then applied to the number of private sector beds (7590) estimated for 1984.

The demand for private practice physicians was determined within the constraints postulated by the model, i.e., the number of doctors necessary to produce the desired volume of services while maintaining the 1964 balance between those working in the public and private sectors. The resulting projection of almost 4500 private sector physicians in 1984 represents an average annual increase of 5.1 percent over the number estimated in 1964, or slightly in excess of the 4.8 rate anticipated for the urban population.

The original target of the Planning Office called for almost doubling the per capita production of dental visits, an objective made feasible by an assumed increase in dentist productivity to 5100 visits per year (2.8 per hour). The experience of American dentists suggests this number is unrealistically high; in 1964 the average American dentist produced 3800 visits<sup>a</sup> (including those attended by hygienists working under supervision) and according to estimates of the Royal Commission,<sup>39</sup> the average visits per American dentist in 1962 exceeded 4000 only when two or more full-time

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<sup>a</sup>Based on services provided to the non-institutional population by active dentists serving the same population (1.6 visits per capita times 190 million population divided by 80,000 dentists).

assistants were employed. Moreover, with an evident surplus of Peruvian dentists in 1964, there seemed little objective basis to assume that demand would rise sufficiently rapidly to absorb the projected visits.

Accordingly, other criteria were used to estimate the 1984 demand for dentists. These were

- (1) Public sector demand as called for in the model (i.e., continuation of the 1964 ratio of hospital-based dentist to doctor hours of 1:17, and a ratio of 1:6 in ambulatory care facilities),
- (2) The number of dentists necessary to maintain the same private sector population-dentist ratio in cities of 10,000+ inhabitants as found in 1964.

In a situation where dentists were fully-employed, it would be unwise to link future demand solely to the growth in the urban population; as incomes rise, the per capita demand for dental care is likely to increase. However, with the average dentist working at a low hourly output for only 32 hours per week in 1964, it seems reasonable to assume that the increased per capita demand of urban Peruvians can be met by gains in dentist productivity. As this occurs, the gap between physician and dentist income should narrow and the proportion of dental graduates retained in the profession, greatly increase. Once the slack is removed from the system, the growth rate of the demand for dentists should probably stabilize somewhat in excess of that of the urban population.

During the 1960-66 period the number of pharmacies increased annually at about 1.8 percent. The 1984 projection of 2066 retail pharmacists is

is based on a continuation of this rate and an average of 1.1 pharmacists per 1000 pharmacy. Although the projected growth rate is considerably below that forecast for the urban population, it can be defended by the following reasoning:

- (1) The supply of pharmacies in the 1960-66 period exceeded demand as evidenced by the low growth rate and the low proportion of pharmacists staying in the profession. Although officially illegal, it was generally admitted that many pharmacists worked only part-time in their pharmacies while others operated two pharmacies, the second one being nominally registered under the name of a pharmacist not actively engaged in the profession.
- (2) The practice of pharmacy is apt to be much more strictly regulated in 1984 than in 1964. As pharmacists increasingly find themselves obliged to stay full-time in the pharmacy or seek other employment, there will likely be an extended period during which the incentives to open new pharmacies will remain limited.

With the growth rate of the urban population exceeding that of pharmacies, a balance between supply and demand will eventually be attained, after which the two growth rates should become approximately equal.

In the same 1960-66 period the number of pharmacies per wholesale drug distributor averaged about 10:1. In projecting the number of wholesale pharmacists in 1984 (207) it is assumed that this same relationship will be maintained and that there will be an average of 1.1 pharmacists employed per distributor.

Historical data on the demand for industrial pharmacists, even if available, could probably not be used to project requirements. In 1960 there was almost no national industry whereas by 1964 it accounted for over half of the pharmaceutical products consumed in Peru. Future growth of the industry is likely to approximate that of the urban population. However, since other scientific personnel unqualified in pharmacy (industrial chemists, engineers, biologists, etc.) can fulfill many of the positions that would otherwise go to pharmacists, it seems reasonable to assume that the annual increase in the demand for pharmacists will be much more modest. Projections assume a two percent annual increase over those employed in 1966 according to the Bureau of Pharmacy's registry.<sup>a</sup>

The declining proportion of home deliveries attended by professional midwives has already been noted and with a major expansion in the number of hospital beds forecast, this trend seems likely to continue. The projection for 1984 assumes an annual growth rate in the demand for midwives in private practice equal to one half that expected for the urban population. On the assumption that the average full-time midwife in private practice could attend 200 deliveries per year, this means that the 240 midwives projected would attend over 12 percent of the deliveries estimated for the urban population. The impact on the demand for midwives of an expanded government maternity care program will be discussed in Chapter 11.

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<sup>a</sup> According to the Royal Commission's report (Vol. II, ref. 34, p. 35), there were 612 pharmacists employed by industry in Canada in 1962. Since Canada's population then was almost as large as the projected 1984 Peruvian population, and the drug industry was considerably larger, the projection of 434 Peruvian pharmacists employed by industry does not appear unreasonable.

Productivity Assumptions

As a result of improved staffing ratios and work organization, major gains in public sector productivity are assumed. The expected gains in private sector productivity are, by comparison, small (Table 10-2).

Table 10-2. ASSUMED BED, PHYSICIAN AND DENTIST PRODUCTIVITY: by Sector: Peru, 1964 and 1984

| SECTOR AND SERVICE              | SERVICES PER RESOURCE PER YEAR |      |
|---------------------------------|--------------------------------|------|
|                                 | 1964                           | 1984 |
| <u>Private Sector</u>           |                                |      |
| Discharges per short-stay bed   | 17                             | 23   |
| Visits per doctor <sup>a</sup>  | 5000                           | 5500 |
| Visits per dentist <sup>b</sup> | 2400                           | 3100 |
| <u>Public Sector</u>            |                                |      |
| Discharges per short-stay bed   | 16                             | 27   |
| Discharges per long-stay bed    | 0.9                            | 1.5  |
| Visits per doctor <sup>c</sup>  | 4400                           | 8300 |
| Visits per dentist <sup>d</sup> | 1800                           | 3500 |

<sup>a</sup>Relatively low output assumed for 1984 reflects lack of auxiliary personnel, limited private sector demand, and the fact that in this sector a doctor-year includes time spent with both in- and outpatients.

<sup>b</sup>Assumes that by limiting dentist supply to the growth in demand, both the hourly productivity and number of hours worked per dentist will increase.

<sup>c</sup>Based on F.T.E. doctor-year providing services to ambulatory patients only (i.e., no administrative or inpatient responsibilities). Estimate for 1964 is very approximate and assumes that about 57% (based on the findings in several detailed institutional studies) of the F.T.E. public sector doctors worked in ambulatory care only. The 1984 target assumes a work-year of 2080 hours and an average hourly output of 4 visits.

<sup>d</sup>Reflects increased output (largely due to auxiliary personnel) and number of hours worked (1820). This 1984 target appears reasonable when compared with the average of 3800 visits produced per American dentist in 1964.

Manpower Requirements

The consolidated 1984 demand projections according to the demand model are given in Table 10-3, along with the projected supply for the principal categories of professional manpower. The implications of, and possible alternatives to, these demand projections are discussed in later sections.

Table 10-3. PROJECTED DEMAND FOR HEALTH MANPOWER ACCORDING TO THE MODEL; PROJECTED SUPPLY OF SELECTED CATEGORIES OF PROFESSIONALS: Peru, 1984<sup>a</sup>

| PERSONNEL<br>CATEGORY | PROJECTED SUPPLY            |                               | PROJECTED 1984 DEMAND |                  |                   |                |
|-----------------------|-----------------------------|-------------------------------|-----------------------|------------------|-------------------|----------------|
|                       | Present<br>Retention<br>(I) | Maximum<br>Retention<br>(III) | Number                | % of time in     |                   |                |
|                       |                             |                               |                       | Public<br>Sector | Private<br>Sector | Educa-<br>tion |
| ALL                   | -                           | -                             | 114,800               | 86               | 12                | 2              |
| Physicians            | 12,400                      | 13,300                        | 13,900                | 64               | 32                | 4              |
| Dentists              | 2,400                       | 3,400                         | 3,400                 | 21               | 77                | 2              |
| Pharmacists           | 2,700                       | 3,700                         | 3,300                 | 15               | 83                | 2              |
| Nurses                | 8,500                       | 12,000                        | 10,700                | 87               | 9                 | 4              |
| Midwives              | 1,000                       | 1,900                         | 1,400                 | 67               | 31                | 2              |
| Sanit. Engs.          | -                           | 700                           | 600                   | 96               | -                 | 3              |
| Social Workers        | -                           | -                             | 800                   | 97               | 3                 | -              |
| Health Educ. s.       | -                           | -                             | 225                   | 100              | 0                 | 0              |
| Other Profs.          | -                           | -                             | 200                   | 100              | -                 | -              |
| Diet., Nut.           | -                           | -                             | 375                   | 91               | 8                 | 1              |
| Lab. Techs.           | -                           | -                             | 2,100                 | 87               | 12                | 1              |
| X-ray Techs.          | -                           | -                             | 1,200                 | 88               | 11                | 1              |
| Other Techs.          | -                           | -                             | 500                   | -                | -                 | -              |
| Occup. Thers.         | -                           | -                             | 100                   | 97               | 0                 | 3              |
| Physic. Thers.        | -                           | -                             | 425                   | 97               | 2                 | 1              |
| Sanit. Inspe.         | -                           | -                             | 1,800                 | 100              | 0                 | 0              |
| Sanitarios            | -                           | -                             | 1,000                 | 100              | 0                 | 0              |
| Auxil. Nurses         | -                           | -                             | 27,200                | 92               | 8                 | 0              |
| Auxil. Pharms,        | -                           | -                             | 875                   | 90               | 10                | 0              |
| Admin. & Serv.        | -                           | -                             | 45,300                | 85               | 13                | 2              |

<sup>a</sup>Based on working table in Appendix L. Numbers below 1000 rounded to nearest 25; above 1000, to nearest 100. A dash (-) indicates that no separate estimate was made.

Projected Costs:

Two alternative methods for estimating costs were considered:

- (1) Develop a cost model similar to the one used for estimating the cost of the sector in 1964 in which the imputed income for each type of health worker is multiplied by the number of workers and certain other assumptions are used for calculating the probable expenditures for drugs, materials and construction;
- (2) Multiply the estimated cost of the instruments of health policy used in projecting demand (bed-year, doctor-hour, etc.) by the number of such instruments planned, and add appropriate amounts to cover the costs of other activities such as public health programs, etc.

The first method, though perhaps not giving the same sense of precision as does the second, offers several important advantages. First, it is not necessary to prorate shared cost components (e.g., laboratory facilities, administrative services, etc.), to separately estimate public and private sector costs, or to make separate estimates of the amount to be spent on manpower training. Second, this method, by being consistent with the one used for the 1964 estimates, is less apt to introduce extraneous errors due to different procedures of calculation. Whatever errors are in the cost estimates for the target years will probably be in the same direction and of the same general magnitude as occurred in the 1964 estimate.

Adopting this approach, the estimated cost in 1984 of the demand model is given in Table 10-4.

Table 10-4. ESTIMATED COST OF THE HEALTH SECTOR ACCORDING TO THE DEMAND MODEL: by Expenditure Category: Peru, 1984<sup>a</sup>

| EXPENDITURE CATEGORY | 1984 EXPENDITURES FOR HEALTH (in 1964 soles) |                             |
|----------------------|--|-----------------------------|
|                      | % of total<br>(N=18.0 billion)               | As % of G.N.P. <sup>b</sup> |
| Personnel            | 53   | 2.9                         |
| Goods and Services   | 38   | 2.1                         |
| Investments          | (9)  | (0.5)                       |
| Facilities           | 5  | 0.3                         |
| Water & Sewage       | 4  | 0.2                         |
| <b>TOTAL</b>         | <b>100</b>                                   | <b>5.5</b>                  |

<sup>a</sup>Based on assumptions and methodology given in Appendix M.

<sup>b</sup>Projection of G.N.P. (327.1 billions of 1964 soles) is based on a National Planning Institute estimate of a 6.0% real growth rate to 1970 and a 6.5% rate thereafter. In the light of the past performance of the Peruvian economy, these appear to be reasonable assumptions.

Several observations are pertinent in judging the validity of the overall estimate that the demand model will cost about 5.5 percent of the G.N.P. in the target year. First, the annual real increase in income levels represents a key assumption in projecting sectoral costs. As noted in the Introduction, this averaged 3.4 percent for governmental salaries during the 1950-63 period. The assumed rate for the 1964-84 period -- three percent -- is lower than the observed rate for any other segment of the labor force except those employed in agriculture. Theoretically, if the economic and population forecasts are correct and no changes occur in the 1964-84 period in the proportionate size of the labor force, or in the distribution of income, real salaries should increase about 3.1 percent

annually. All these conditions are unlikely to be fulfilled, however, and in deciding what rate is most apt to use for the health sector, the planner is confronted with a dilemma. If governmental plans for income redistribution are to be realized, wages paid to low level employees, including about two-thirds of those working in the health sector, should rise more rapidly than professional income. On the other hand, the trend in recent years has, if anything, been in the opposite direction and indeed may be strengthened if policies aimed at decreasing underemployment in the health professions are successful. Furthermore, the decision to equalize public sector salaries will, at least over the short-run, lead to an annual real increase in the costs of inputs well in excess of three percent. Rather than attempt correcting for all these factors, the most prudent course appears that of assuming a flat three percent increase for all levels of health manpower. It should be pointed out, however, that a 0.2 percent change in the real annual increase in salaries will result in a 0.1 percent change in the proportion of the 1984 G.N.P. spent on health.

The assumption that real construction costs will remain constant seems, at first glance, highly unlikely. According to Central Reserve Bank data, during the 1950-65 period construction prices increased more rapidly than any other major sector of the economy and gains in productivity per worker were low. The recent and very substantial expansion of the construction industry may help counteract these trends in the future. Moreover, as the National Health and Welfare Fund expands its construction programs, substantial savings will likely be realized through standardized facility design and other construction economies. In any event, changes in the unit costs of construction have relatively little impact on total

sectoral expenditures; a 1.5 percent annual change in construction costs produces only a 0.1 percent change in the G.N.P. allocated to health.

The demand model provides no basis for independently calculating the amount to be spent on goods (including drugs) and services. The approach used was to assume "fixed factor proportions", i.e., that the proportion of base year health expenditures allocated to this category (38%) will remain constant over time. In fact, and for reasons already suggested in Chapter 9, the proportion actually spent may decline somewhat, particularly if action is taken to control the costs of medicines and to more strictly regulate their distribution.

Summarizing, the cost estimates of personnel and capital investments appear more likely low than high, and of goods and services, vice versa. Since the first two categories are considerably larger than the third, the net effect of the assumptions used is probably towards under-estimating how much the postulated health sector would actually cost Peru.

It may be objected that by using global cost estimates, the important issue of who is to pay for the health system is not considered. While the national economy might be able to support a given level of health sector development, this may not be the case if the whole burden were to be placed, for example, on either the private or public sector alone. If the basic assumption made in the model is accepted, i.e., that the growth of the public and private sectors will be approximately parallel, this problem should not arise. Unfortunately, experience suggests that this objective is difficult to attain. The financial problems of Chile's National Health Service are typical of those faced in a number of countries where the public sector is expected to bear an increasing share of the

costs of social services (health, education and welfare) despite a growing ability within the private sector to do its part.

To avoid such problems, Peru must seek ways to preserve and extend the principle that the consumer public should bear at least part of the costs of health care. A monograph on health manpower cannot enter into the specifics of financing, particularly for a period as long as twenty years. However, unless this issue is imaginatively faced so that the burden for paying for health care continues to be equitably shared by individuals and by government, irrespective of which sector assumes the major responsibility for the provision of services, even the modest improvements in the health sector postulated in the demand model may not prove feasible.

#### Conclusions and Alternatives

Gross inspection of the manpower requirements of the model suggests that with the exception of medical, nursing, auxiliary nursing and technical personnel, the demand for all major categories of health manpower targets can be met with relatively small changes in school output.

There is ample reason to be concerned about the cost of the model. According to these estimates, Peru would increase the proportion of the G.N.P. allocated to health by more than 30 percent in the twenty-year period, a growth as great as that observed in Canada<sup>40</sup> (4.1 to 5.4%) and the

United States<sup>41</sup> (4.0 to 5.4%) from 1940 to 1960. However, both of these latter countries had attained much higher income levels by 1940 than Peru will reach in 1984 and neither had as pressing needs for competing investments in agriculture, industry, transportation and general education. Whether Peru can reasonably afford to increase the share of the G.N.P. allocated to health by this amount should merit careful consideration by the government.

It can also be questioned whether the actual demand for services will be sufficient to warrant the proposed rate of sectoral expansion. The problem is essentially that of estimating the retardant effect Peru's large rural population is likely to exert on demand. To illustrate this point, the following reasoning can be developed for doctor visits:

- (1) In 1964 it is estimated that rural residents (those living in districts with an urban population of under 10,000) averaged about 0.3 visits per capita as compared with 3.4 visits for urban residents.
- (2) According to the demand model, the public sector will produce 0.7 visits per capita for rural residents in 1984. Optimistically assuming an additional 0.3 visits are obtained from the private sector, the rural utilization rate of 1.0 would represent a threefold increase.
- (3) If the 1984 target of 63 million visits is to be reached, this would mean urban residents would have to average almost 4.8

visits per capita. This rate is comparable to, or in excess of, that found in industrialized countries with much higher income levels and older populations than are forecast for Peru in 1984.

The same question -- of whether the planned number of services can be absorbed -- can also be asked about the demand for hospital care. The demand model postulates both a 13 percent increase in the beds per 1000 (to 2.7) and a 56 percent increase in the average bed turnover rate (to 22), even though occupancy rates are now lowest precisely in those regions scheduled to benefit most from new hospital construction. Needless to say, the resource wastage that might result from the under-utilization of new hospital facilities would be even more unfortunate than in the case of ambulatory services.

In view of these doubts, it is useful to consider an alternative demand model based on a more moderate rate of sectoral growth. The method used to estimate demand (by sector and type of activity) makes it easy to calculate the approximate effect of alternative policies. Table 10-5 shows the resource costs or savings of a one percent change in the volume of the principal public sector activities.

In selecting an alternative, no magic formula exists to decide which activities should be cut or by how much. The estimates given in Table 10-5 do show, however, that a given percentage cut in short-stay hospital care will result in greater economies of funds and of nursing personnel, and have a smaller impact on the distribution of health services, than will a comparable reduction in ambulatory care. Moreover, since hospital care is essentially curative in orientation while ambulatory care

Table 10-5. ESTIMATED RESOURCE COSTS OR SAVINGS OF A ONE PERCENT CHANGE<sup>a</sup>  
IN THE VOLUME OF SELECTED PUBLIC SECTOR SERVICES: Peru, 1964

| ITEM                                       | EFFECT OF A 1% CHANGE IN 1984 IN THE<br>NUMBER OF PUBLIC SECTOR SERVICES |  |                                |
|--|--|--|--------------------------------|
|  | Short-stay<br>discharges <sup>b</sup>                                    | Long-stay<br>hospital<br>services <sup>c</sup> | Doctor,<br>visits <sup>b</sup> |
| <u>Services Produced</u>                   |  |  |                                |
| Number                                     | 9100   | 150  | 315,000                        |
| Per 1000                                   | 0.43   | 0.07   | 15                             |
| <u>Full-time Equivalent Personnel</u>      |  |  |                                |
| Physicians                                 | 24   | 4  | 45                             |
| Nurses                                     | 75   | 10   | 9                              |
| Other profs.                               | 12   | 1  | 11                             |
| Technicians & equivalent                   | 10   | 3  | 23                             |
| Auxiliary nurses                           | 128  | 17   | 74                             |
| Other personnel                            | 220  | 31   | 102                            |
| Total                                      | 469  | 66   | 264                            |
| <u>Expenditures (mills. of 1964 soles)</u> |  |  |                                |
| Capital                                    | 8  | 1  | 1                              |
| Operating                                  | 52   | 7  | 47                             |
| As % of 1984 G.N.P.                        | 0.018  | 0.002  | 0.015                          |

<sup>a</sup> From the targets established in the original demand model.

<sup>b</sup> Excluding those discharges and visits produced by medical posts.

<sup>c</sup> Number of services produced refers to hospital discharges; personnel and expenditures refer to the resources affected by a 1% change in both discharges and associated ambulatory care (which is a small part of the total cost).

tends to emphasize prevention and the early diagnosis and treatment of disease, it is reasonable to reduce the former more than the latter. The postulated alternative, termed the "moderate growth model" (as differentiated from the previously described "rapid growth model"), makes the following assumptions:

- (1) That health expenditures will be reduced from 5.5 to 5.0 percent of the 1984 G.N.P.,
- (2) That the volume of public sector short- and long-stay hospital discharges produced will be 17 percent less, and of doctor visits, 10 percent less than called for in the rapid growth model,
- (3) That the remaining targets set for the public sector in the rapid growth model will be met,
- (4) That no changes will occur in the private sector demand for personnel. This last assumption is made for two reasons:
  - (1) no better bases exist (than those already used) to estimate the demand for private sector dental, pharmaceutical and midwifery personnel;
  - (2) if public sector medical services are reduced, private sector demand for the same services will, if anything, be augmented.

Table 10-6 compares the characteristics of the two models of sectoral growth. The next chapter discusses the implications of these models for manpower policy.

Table 10-6. COMPARISON OF SELECTED CHARACTERISTICS OF THE TWO MODELS  
USED TO PROJECT MANPOWER DEMAND: Peru, 1984

| ITEM                      | DEMAND PROJECTIONS IN 1984 BY ALTERNATIVE |                    |
|---------------------------|---|--------------------|
|                           | Rapid<br>Growth                           | Moderate<br>Growth |
| <u>Services per 1000</u>  |   |                    |
| Hospital discharges       | 60  | 52                 |
| Doctor visits             | 3000                                      | 2900               |
| Dentist visits            | 500                                       | 500                |
| Immunizations             | 450                                       | 450                |
| % of G.N.P. Expended      | 5.5                                       | 5.0                |
| Beds per 1000             | 2.7                                       | 2.4                |
| <u>Personnel Required</u> |   |                    |
| Doctors                   | 13,900                                    | 13,000             |
| Nurses                    | 10,700                                    | 9,200              |
| Other profs.              | 9,700                                     | 9,400              |
| Lab techs.                | 2,100                                     | 1,900              |
| X-ray techs.              | 1,200                                     | 1,100              |
| Auxiliary nurses          | 27,200                                    | 24,000             |
| Other personnel           | 50,000                                    | 44,500             |
| Total                     | 114,800                                   | 103,100            |

**Part III**

**THE FUTURE:**

**MANPOWER PLANS, POLICIES AND ISSUES**



Chapter 11

BRINGING SUPPLY AND DEMAND INTO BALANCE

The demand models described in the preceding chapter suggest two ways -- consistent with present knowledge -- in which the sector's capacity to produce health might be improved. Even a growth rate comparable to that assumed in the smaller model will require an enormous effort by both the public and private sectors. Not only are the quantitative targets ambitious, but they assume concurrent improvements in the quality and distribution of health services -- objectives that often prove more elusive than those relating to quantity.

In terms of cost, the two demand models differ substantially. From the point of view of manpower planning, however, they are remarkably similar. Simply stated, the manpower objectives of both can be summarized as follows:

- (1) Maintain the training rate of physicians, dentists, pharmacists, and perhaps midwives (depending on future policy, to be discussed), relatively constant until the population growth brings supply and demand into approximate balance;
- (2) Increase the supply of nurses, auxiliaries, and technicians as rapidly as possible consistent with available educational resources;
- (3) Preferentially deploy health manpower in those activities that emphasize health promotion and disease prevention;

- (4) Modify training as necessary to better match the trainee to his job.

The remaining sections of this chapter consider ways in which these objectives can be attained. The numerical expression of the alternative policies should not, of course, be too strictly interpreted. Only one statement can be made with certainty about the health sector in 1984: it won't be identical with the situation postulated in either demand model. The numbers do, however, suggest the relative educational effort called for in each manpower category, and for this purpose they can be regarded as acceptably accurate.

Physicians

Quantity. According to the estimates given in Table 11-1, to satisfy the moderate demand projection, no changes are required in medical school enrollment in the 1960's and only minimal ones in the 1970's. Such changes as are necessary should be accomplished in two stages: first, expansion of the enrollment at the existing schools until they are operating at their most efficient capacity; second, and only after the first step has been taken, opening a new medical school.

Table 11-1 PROJECTED PHYSICIAN SUPPLY AND DEMAND: by Hypothesis:  
Peru, 1974 and 1984

| PROJECTION      | YEAR |       |
|-----------------|------|-------|
|                 | 1974 | 1984  |
| <u>Supply</u>   |      |       |
| I               | 8700 | 12400 |
| II              | 9000 | 12900 |
| III             | 9300 | 13300 |
| <u>Demand</u>   |      |       |
| Moderate Growth | 8300 | 13000 |
| Rapid Growth    | 8500 | 13900 |

The timing of and precise way in which these steps are taken will, of course, depend on factors that cannot now be determined. Nevertheless, the following measures would appear reasonable:

- (1) Increase the intake of pre-medical students at the existing schools so that the number of first year medical students in 1974 equals about 530 (instead of 460 as assumed in the supply projections). The additional 200 physicians that would result, when added to the most likely supply hypothesis (II), would be adequate for the projected demand of 13,000.
- (2) Accept pre-medical students for a new school in 1975, with the first class becoming available in 1983. In view of the over concentration of physicians on the coast, the school might best be located in a sierra city the size of Cuzco or Huancayo. During the first few years the entering class should average at least 30, being raised to about 50 as soon as resources permit.

The demand projected according to the rapid growth model would require a substantial expansion in medical school capacity and should be undertaken only after very careful consideration of the costs. In this assessment, the additional problems created for medical educators, however difficult, are probably of least significance. Of much greater importance is the effect 900 more physicians will have on the cost of the health sector and on the feasibility of improving the ratio of medical to non-medical personnel. To meet a projected target of 13,900 physicians, the following measures would likely be necessary:

- (1) Expand the first year enrollment of the existing schools from 460 to about 560 (e.g., 150 at San Marcos, 100 at the other two

Lima schools, 30 at Cajamarca, and about 60 each at the other three schools), effective in 1971. This would add about 600 to the 1984 supply.

- (2) Accept pre-medical students for a new school in the sierra in 1970 (adding about 150 graduates by 1984) and perhaps a second new school of larger capacity in Lima several years later.
- (3) Adopt measures to maximize the retention of physicians in active practice and encourage their return from the United States and other foreign countries.

Quality. The past generation has witnessed a remarkable improvement in the quality of medical education in Peru. Controlled admissions, more salaried teachers, improved teacher-student ratios, and a strong emphasis on supervised experience all are contributing to provide the medical graduate with a solid technical training. This basic preparation will soon receive added support as the new residency programs begin to place undergraduate education in the perspective of a lifetime of learning.

Despite these encouraging developments, there is a growing concern as to whether the medical schools are producing the type of physician needed by Peru. These doubts center on the emphasis currently being placed on the medical students' scientific and technical background. Unless this is matched by comparable improvement in the way students are prepared in the social and preventive aspects of health care, the young graduate may have a "trained incapacity" to meet most of his country's health needs. Overwhelmed with the tenacious roots of patient ills, and frustrated by the lack of the equipment, facilities, and ancillary personnel that were available during medical training, he may seek to avoid these problems through specialization or even emigration.

But the possibility that many graduates will find the practice of community medicine uncongenial is not the only concern. What of those that are employed in the public sector? Will they work effectively with auxiliary personnel? Will they be adequately prepared to care for a population suffering primarily from communicable disease, poor nutrition and the effects of inadequate sanitation? Will their primary focus be on prevention rather than cure? The eventual outcome of the ambitious plans of the Ministry of Health to extend health care throughout the country with subsidiary networks of medical and health posts will depend in large part on the answer to these questions.

Most of the responsibility for teaching these broader aspects of medicine has traditionally been assigned to the Department of Preventive Medicine. The record of the past has not been favorable. In order to know what curriculum changes might be indicated, the Faculty of Medicine at San Marcos surveyed in 1964 a sample of 126 physicians drawn from the three natural regions of the country.<sup>42</sup> Almost seven of every eight doctors interviewed considered their preparation in preventive medicine inadequate, this discipline being rated lower than any other part of the curriculum.

Several medical schools have recognized the weakness of instruction in the social and preventive aspects of medicine and are making a concerted effort at improvement. One of the key problem areas has been to find competent teachers available on more than a part-time basis. In 1964 the Departments of Preventive Medicine in all of Peru's schools were staffed

with only one or several public health physicians already in full-time government employ. On such a basis it is not surprising that they have had very little influence on either students or fellow faculty members.

But even if full-time teachers can be found, success will remain only partial as long as almost all of the students' clinical experience is provided by the teaching hospital. Students and faculty both must be involved in the problems of the community. The professor of a clinical specialty would consider himself greatly handicapped if he had no hospital bed to teach from; yet, at the time of survey, none of Peru's schools had what could be considered a "community to teach from". The experience of a number of medical schools in Colombia, Chile, Puerto Rico and elsewhere suggests that only if the whole school assumes responsibility for the total health care of a designated population can the links between prevention and cure, culture and sickness, technical knowledge and humanitarian devotion, be fully understood and exploited.

Peru's medical schools alone cannot effect a transformation in the pattern of medical practice. The service agencies will have to modify existing programs and develop new ones so that the institutional organization of health services is better suited to the practice of community medicine. Already there are signs of change. At the national level, the two insurance programs are considering how best to extend certain health benefits to dependents and to achieve some coordination of their programs and facilities. If such measures are adopted, the effect on medical practice could be great. The Ministry of Health started experimentation in 1964 with a small program in which selected medical graduates are given several months of intensive training and then sent for a year's time to direct, under

periodic supervision, an isolated medical post. The Ministries of Health and Navy have jointly sponsored a new program to bring health care to villages along the Amazon and its tributaries. These efforts, however, only represent a beginning. Much more must be done if doctors are to go to the provinces in sufficient numbers, the trend towards specialization checked, physician emigration reversed, and total community health care needs met. Good training and a desire to serve will not go far if the opportunities to put this knowledge and dedication are not forthcoming.

#### Dentists

Quantity. The projected demand for dentists is 2400 in 1974 and 3400 in 1984, compared with alternative supply projections of 2200, 2300, and 2800 in the earlier year, and 2400, 2900 and 3400 in the later year. The apparently favorable balance between supply and demand, at least through the mid-1970's, must be tempered by two uncertainties: (1) will dentists who have left the profession return to active practice as conditions become more favorable; and (2) are the assumptions used to project private sector demand valid? Probably both questions are best answered by the word "partially".

As regards the first point, it seems doubtful that any feasible improvement in the conditions of practice could attract back all those presumed to have left the profession. Such changes could, however, substantially reduce the proportion of young graduates leaving, thus making it possible for the 1984 supply to exceed 3000.

The probable evolution of private, and even public sector demand for dental care, is much less clear. According to the demand models proportionately greater increases are projected in medical than in dental services,

although usually the reverse would be expected once income levels become adequate to allow for more than the barest necessities. Fortunately, the speculation which might otherwise be occasioned about how demand will actually evolve is in large part irrelevant; given the evidence of a dentist surplus, a policy of increasing the output of dentists is clearly not indicated at this time. Moreover, since dental education is shorter and a temporary dentist shortage affects the utilization of other resources much less than in the case of physicians, the planner is not so obliged to make long-range projections. Hopefully a monitoring system could be devised to estimate the strength of private sector demand, using such indicators as the average hours worked and visits produced per week, costs of dental services, and the retention of dentists in the profession. Subsequent decisions to increase dentist output could then be linked to the attainment of a given percentage (taking into account the time necessary to modify the output of graduates) of a desired standard of dentist productivity.

In view of these considerations, educational planning for the dental profession should emphasize flexibility. The large number of inactive and marginally active dentists should be reduced substantially before the decision is made to expand enrollments. Assuming the 1984 demand projection of 3400 dentists is approximately correct, the following measures would be appropriate:

- (1) Accept as many qualified pre-dentistry applicants as apply up to the combined maximum capacity of the two schools (115 students).
- (2) Reduce the attrition of dental students from 25 to about 15 percent.

(3) Reduce the loss of young dental graduates from active practice from an estimated 37 percent to 15 percent.

If the first two objectives were attained by 1970 and the latter one gradually implemented over the second decade, the 1984 supply would equal about 3300. By 1974 a third dental school might be opened with an entering class of 30 to 40, thus boosting the total supply in 1984 to almost 3500 and providing a basis for further expansion during the next decade.

Quality. Dental educators are faced with a dilemma; should dental training be primarily oriented towards the modern concepts of preventive and restorative dentistry, or should it emphasize the types of problems most likely to be encountered in private practice. Assuming the former policy were adopted, one logical consequence would be for the dental schools to prepare para-dental personnel to work under professional supervision. In this way the cost of routine preventive care could be lowered and dentist productivity -- qualitatively and quantitatively -- raised. Unfortunately, in the face of a current surplus of dentists and a low premium on preventive dentistry among the consuming public, it is unlikely that such a policy would have the desired effect.

The relative balance between public and private sector dental care will probably be the decisive factor in resolving this dilemma. If the projected 1984 ratio of almost four private sector dentists per public sector dentist is realized, there is little reason to consider major changes in the current study curriculum. The quality of instruction can, of course, be improved, but the emphasis should continue to be on curative and palliative dentistry -- the "bread and butter" of private practice. Conversely, if the public sector assumes a much greater role in providing dental care than now forecast, major curriculum changes may be justified as well as the training of para-dental personnel.

Pharmacists

Quantity. The situation in pharmacy closely parallels that just described in dentistry. According to recent trends in the private sector, and the relatively small demand projected for the public sector, about 3300 pharmacists will be needed by 1984. This compares with alternative supply projections of 2700, 3000 and 3700.

As in dentistry, there are a number of uncertainties that cannot now be answered about how private sector demand will grow. However, with a low retention rate manifest among recent graduates, pharmacist output should not be increased above present levels until a more adequate balance is attained between supply and demand. When this point is reached, the first planned increment should be made by increasing the first year class at the existing schools to their capacity of 145 (instead of 100 as assumed in the supply projections).

One way in which future educational programming could be linked with the growth in demand is outlined below.

- (1) Develop standards of what constitutes full employment of pharmaceutical personnel. These might be expressed as the proportion of pharmacists actively engaged in the profession as a function of sex and decade of graduation.
- (2) Apply these standards to the number (and estimated number) of graduates in the four or five decades preceding the target year to determine the aggregate retention rate expected in a full employment situation. For example, the following retention rates might be used as standards:

| TEN-YEAR<br>COHORT OF<br>GRADUATES | % ACTIVELY EMPLOYED<br>IN PHARMACY |        |
|------------------------------------|------------------------------------|--------|
|                                    | Male                               | Female |
| 1 (youngest)                       | 92                                 | 80     |
| 2                                  | 87                                 | 70     |
| 3                                  | 85                                 | 60     |
| 4 (oldest)                         | 70                                 | 45     |

According to these standards, the aggregate retention rate expected in a full employment situation would be as follows:

| YEAR | % OF GRADUATES ACTIVE <sup>a</sup> |
|------|------------------------------------|
| 1964 | 81                                 |
| 1974 | 77                                 |
| 1984 | 72                                 |

<sup>a</sup>The importance of adjusting for changing sex ratios is evident; if pharmacy were a male profession the full employment retention rates would be raised to 89, 87, and 85 percent.

- (3) Devise a monitoring system to measure current employment levels and determine trends. Continuing with the example cited, it might be found in 1973 that by extrapolation of the trend observed in the retention rate of preceding years, a full employment situation (i.e., about 72% retention) can be anticipated by 1981. Plans would then be made to increase the enrollment of the schools of pharmacy so as to avoid the shortage that would otherwise develop after 1981.

In Chapter 10 it was suggested that the vigor with which the government enforces the legislation governing pharmacy operation may be an important determinant of demand. A strict policy would presumably hold down pharmacy openings until retail pharmacy becomes a more attractive career. If such a policy is not adopted, the private sector may be able to absorb more pharmacists than the number projected. A distinction must be made, however, between a private sector demand adequate to induce pharmacists to open pharmacies under circumstances where they can also seek outside employment, and a real demand for full-time pharmaceutical personnel. Peru needs too many chemists and allied scientists to be able to afford training pharmacists that are not fully-utilized.

What Kind of Pharmacist is Needed? There is no easy answer to this question. The changes that have occurred in the pharmaceutical industry and their effect on the practice of pharmacy are inadequately understood. Too little attention has been given to how drugs are distributed in communities where medical care is limited and the educational level of the public is low. In such situations the public does not clearly distinguish between the pharmacist and the physician; for the man in the street, both are trained in the health sciences, but the pharmacist is more accessible and frequently more comprehensible than the physician. Moreover, he does not charge for his consultation. It is easy to understand why it is often said that for many Peruvians, the pharmacist is the "doctor of first resort". Do the risks of the pharmacist diagnosing and treating illness outweigh the possible benefits? Could the risks of the present pattern of drug distribution be reduced; could the benefits be increased by making appropriate changes in pharmacy training and in the practice of pharmacy? While

definitive answers cannot yet be given, experience and reason provide a point of departure for future discussion.

In assessing the adequacy of pharmacy training, it is useful to review the essential responsibilities society expects professional pharmacists to fulfill. Four broad categories can be distinguished: the development and production of pharmaceutical products (industrial pharmacy); the regulation and control of the industry, from production to final distribution (administrative pharmacy); the distribution of pharmaceutical products to the public (retail pharmacy); and the training of future pharmacists (academic pharmacy). In terms of the type of skills required, these four categories can be roughly grouped into retail pharmacy on the one hand, and academic, administrative, and industrial pharmacy on the other.

First, what are the basic educational prerequisites for the retail pharmacist? He should have sufficient knowledge about the indications, pharmacology, toxicology and usual dosage of medicines in most frequent use to be able to dispense them safely. His training should prepare him to recognize the principal indications of serious illness so that clients in need of medical attention can be referred. And he should be made aware of his important role as health educator to the public.

The educational requirements for pharmacists working in administrative, academic and industrial pharmacy are different in many important respects. A much more detailed knowledge of analytical and experimental pharmacology, of biochemistry, of administration and of the economics of the production and distribution of pharmaceutical products is needed. Because of the nature of their responsibilities, these pharmacists will be working primarily in the larger cities and at a high level of professional competence.

Faced with major qualitative and quantitative differences in the training required by the two groups, a number of persons interviewed during the course of the manpower study were of the opinion that by attempting to meet the needs for both types of pharmacists in a single program, the schools of pharmacy were unable to prepare either type adequately. The professional pharmacist is well qualified technically for work in retail pharmacy but his expectations often exceed the realities of the job. After five or more years of university studies, he is not apt to be attracted by the routines of retail pharmacy. As a result, many of the functions of the retail pharmacist are left in the hands of the unqualified clerk. Furthermore, the prolonged training in a big city makes it unlikely that the professional pharmacist will locate in the smaller communities, thus necessitating the "peoples' drugstore" with its untrained personnel.

And for the pharmacist working in industry, administration or an academic institution, the five-year program is not enough. Much time is spent learning compounding and other skills that are seldom required or are used only in retail pharmacy, and too little time is available for courses of greater relevance to his future needs. To compensate for these gaps in training, a doctoral program is offered but except for those interested in an academic career, few are willing to complete the two additional years required. By the time the student has completed five years he is anxious to start working and does not appreciate the necessity of further training.

What changes in pharmacy training might be indicated? Some persons interviewed during the manpower study were of the opinion no fundamental changes were required but only that greater supervision and control should be exercised over those in retail pharmacy to oblige the pharmacist to stay

on the job. Others believed that the schools of pharmacy should progressively orient their curricula towards preparing pharmacists for Peru's growing pharmaceutical, chemical, laboratory, and food industries. In their view the length of training should be at least five years and perhaps longer. Time spent on subjects appropriate to retail pharmacy should be reduced but no fundamental change made in the professional requirements for operating a pharmacy.

A proposal that went much further and specifically dealt with some of the problems already outlined, called for training pharmacists in two stages. In this scheme, secondary school graduates would be accepted into a one or at most a two-year program oriented towards the needs of the retail pharmacist. On completing his studies, the graduate would be authorized to operate a Class I pharmacy. This type of pharmacy would stock all but a select list of medicines or chemicals which, by virtue of their toxicity or difficulty in compounding, would be distributed only by Class II pharmacies. Requirements for operating a pharmacy would be gradually tightened so that over time all drug stores operated by practical pharmacists would be eliminated.

The second stage would be for those persons interested in academic, industrial or administrative pharmacy. Training for these careers could either (1) build upon the course required for the practice of retail pharmacy, or (2) be completely separate. The first alternative offers several advantages. By requiring all students to first complete the short course in retail pharmacy, graduates of the advanced program would be better prepared to discharge their responsibilities with respect to the retail pharmacist. The need for separate training programs at the basic level would be avoided

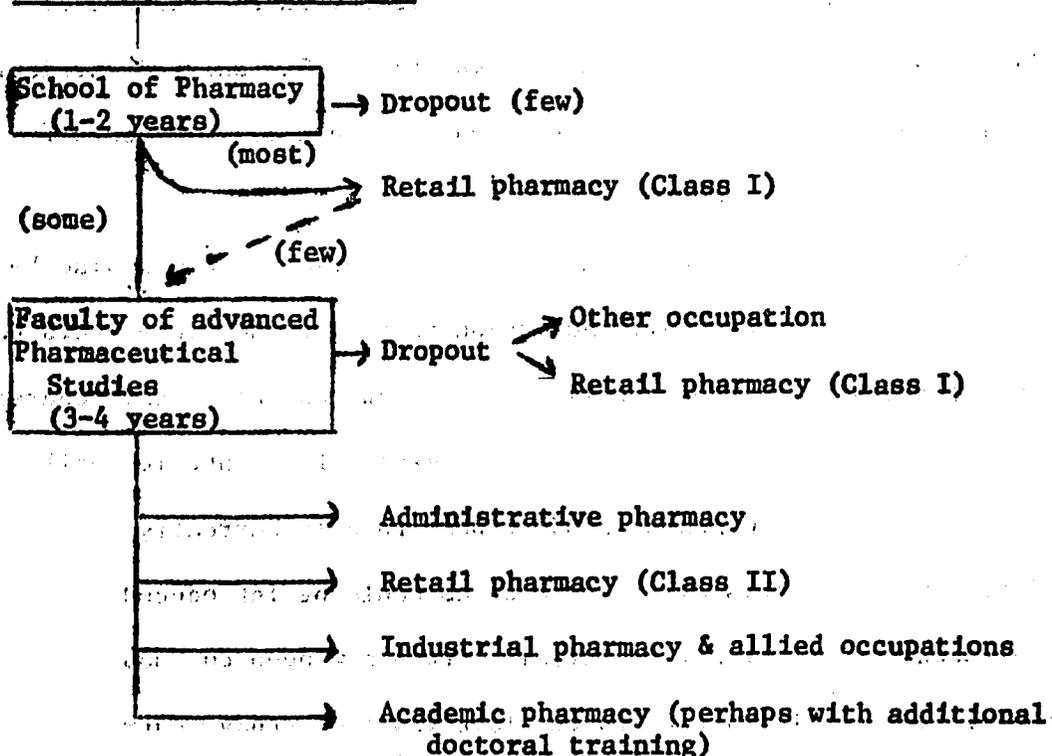
and schools would be better able to select candidates for advanced training since selection would come at the end of the retail pharmacy cycle rather than at the end of secondary school. The student completing the first cycle would then have three alternatives: to start a life-long career of retail pharmacy; to work in retail pharmacy for a limited time until he is able to afford advanced training; or to pass directly on to advanced studies. Those enrolled in the second cycle would spend the first year taking required courses designed to strengthen their knowledge of the fundamentals of pharmacology and biochemistry, and at least two more years studying those disciplines most relevant to their future career. If the latter years offered the student considerable flexibility in his choice of courses, highly qualified specialists could be prepared in less time, and with less attrition than is now the case with the doctoral program. Graduates of the second cycle, besides being able to enter administrative, academic and industrial careers, would also be authorized to operate the few Class II pharmacies required in the larger cities to handle the demand for special pharmaceutical products.

Alternatively, the two careers could be maintained completely separate from the beginning. Those interested in retail pharmacy could be trained in schools for retail druggists, either operated by a service agency such as the Ministry of Health or under the supervision of a Faculty of Pharmacy. Students pursuing an advanced degree in pharmacy could enter directly into a university program. Although separate programs for the two careers would offer some educational efficiency over the two-stage program in that students interested in advanced training would not have to spend time learning retail pharmacy, it would not be as flexible for students still

uncertain of their interests or aptitudes at the end of secondary school. The ultimate decision on this point is not, however, critical as long as a clear distinction is made between the qualifications and prerogatives of the two types of graduates. The retail pharmacist should be regarded fundamentally as a technician qualified to render an important public service, should be awarded a certificate on completion of his studies, and should be carefully circumscribed in the duties he can perform. In contrast, graduates of the advanced program would be considered professionals, should receive university degrees, and would be expected to function at the highest level of competence.

Schematically, the proposed change in pharmacy education can be depicted as follows (the two-stage pattern is illustrated):

Secondary School Graduate



The scheme just outlined would offer a number of advantages over the existing pattern of pharmacy training. Looking first at the practice of retail pharmacy, the public would be assured more and safer access to modern medicines. By requiring less years of study, a career in retail pharmacy would become more attractive to the student now unable to commit himself to five or more years of university studies. With students coming from the smaller communities as well as large cities, there would be a greater likelihood of graduates locating in communities now without the services of trained pharmaceutical personnel. The expectations of retail pharmacists would conform more to the realities of the job and they would be less apt to seek outside employment. Safety could be ensured through a more vigorous enforcement of the regulations governing the sale of drugs -- a policy that has so far not been adopted since it would likely result in the closure of the only retail outlet for medicines in many communities. The shorter curriculum would also help reduce the high attrition among pharmacy students for both academic and economic reasons.

The need for high level pharmaceutical personnel could also be better served by a two-stage program. Admission to the second cycle could be on a highly selective basis among applicants of known capabilities. Courses could be shaped to the educational requirements of an intellectually and occupationally more homogenous student body than is currently possible. In the latter years of this cycle new courses could be introduced to meet the special needs of the highly technical careers now open to those trained in pharmacy. The attrition rate in the last years of study, currently a major problem since those who drop out cannot legally use their professional training, would be reduced and of less consequence. Students unable to

obtain the advanced degree would still be authorized to operate a Class I pharmacy. In summary, training could be more closely suited to eventual function and educational resources would be used more efficiently.

A proposal such as has been outlined leaves many questions unanswered. Would these changes indeed have the desired effect? How would they affect the income, prestige and professional relationships within the profession of pharmacy and between pharmacy and the other health professions? Would changes similar to those proposed be acceptable? How should the transitional phase between the existing pattern of pharmacy training and the new pattern be carried out? By undertaking studies of these and similar issues affecting the practice of pharmacy, the schools of pharmacy could make an important contribution to the improved utilization of Peru's manpower resources.

Auxiliary Pharmacists. According to the demand projections the public sector will require almost 800 auxiliary pharmacists by 1984 and the private sector, close to 100. Of the several hundred estimated to currently be filling this role in government institutions, probably less than 50 are licensed practical pharmacists. The remainder are essentially without formal qualifications.

Within this large category, three levels of responsibility can be distinguished. Possible ways in which the training requirements for each level might be met are suggested below.

- (1) Dispensing medicines generally without professional pharmaceutical or medical supervision. By 1984 probably less than 50 persons will be working under these conditions. Ideally they should have the same level of training (one to two years) as

proposed for persons authorized to operate a Type I retail pharmacy.

(2) Dispensing medicines under direct medical and periodic pharmaceutical supervision. Numbering between 300 and 500, these auxiliaries would be stationed primarily in small hospitals and health centers. Training should probably last about six months and might be provided by the schools of pharmacy on contract with the Ministry of Health and other governmental agencies.

(3) Working directly under the continuous supervision of a pharmacist. Stationed in the larger health facilities, inservice training should, in most cases, be adequate for this personnel category.

### Nurses

The standard adopted by the Surgeon General's (U.S.A.) Consultant Group on Nursing for estimating nursing needs in general hospitals called for a 1:1 ratio of professional to auxiliary nurse personnel.<sup>43</sup> In Peru the standard used was less than 1:2 and no nurses were included in the staff contemplated for medical posts. Despite these compromises, the smaller projection of 1984 nurse requirements exceeds the probable supply (8500) by 700 and the larger one, by 2200.

In nursing, more than in the other professions, the issue of quantity cannot be considered separately from quality. The way in which this issue is resolved will have a vital bearing on the cost and growth of the sector. Specifically, the dominant question in nursing education is the extent to which the four-year university program should become the model of the future.

The consequences of alternative policies in nursing education are best demonstrated by setting the target of a 1:1 doctor-nurse ratio in 1994 (Table 11-2). The following assumptions are made:

- (1) Population growth: 3.1 percent annually to 1984, 2.0 percent thereafter (to 31 millions);
- (2) Physicians: 13,000 in 1984 (moderate growth rate) or 1:1600 population; 20,700 in 1994, or 1:1500 population;
- (3) Nursing education: the existing hospital and university schools considered in the original supply projections continue operating at the 1974-83 rate; each school opened after 1967 has an entering class of 40; a 15 percent attrition in the three-year program and 20 percent in the four-year program; a three-year graduate costs 50,000 soles and a four-year graduate, 65,000 soles.
- (4) Nursing retention: percentage retained in each 10-year cohort increased to 80 (youngest cohort), 65, 50, 45, and 20. This would give an overall retention rate of 67 percent in 1994.
- (5) Nursing salaries: annual salary for three-year nurses increased over the 1964 estimate by three percent per year to 93,100 soles in 1994; a four-year nurse salary of 107,100 soles (assuming a 15% salary differential as now exists between comparable nursing and midwifery positions).

**Table 11-2. NUMBER OF SCHOOLS REQUIRED, COSTS, AND PERCENTAGE OF UNIVERSITY-TRAINED NURSES EMPLOYED: by Policy Alternative Adopted to Achieve a 1:1 Physician-Nurse Ratio in 1994: Peru**

| ITEM  | POLICY ALTERNATIVES REGARDING NEW SCHOOLS |  |                                |
|---|---|--|--------------------------------|
|   | All schools of the 3-year type            | Ratio of 3-yr. to 4-yr. schools is 4:1 | All schools of the 4-year type |
| <b>Rate of School Openings Required (1969-90)</b> |   |  |                                |
| 1 per year  | 1969-76                                   | 1969-75                                | 1969-73                        |
| 2 per year  | 1977-86                                   | 1976-85                                | 1974-82                        |
| 3 per year  | 1987-90                                   | 1986-90                                | 1983-90                        |
| <b>Schools Required by 1990</b>                   |   |  |                                |
| New   | 40  | 42                                     | 47                             |
| Total   | 57  | 59                                     | 64                             |
| <b>Costs in 1994 (millions of 1964 soles)</b>     |   |  |                                |
| Nursing education <sup>a</sup>                    | 100                                       | 108                                    | 130                            |
| Nurse salaries                                    | 2583                                      | 2621                                   | 2753                           |
| Total   | 2683                                      | 2729                                   | 2883                           |
| % of active nurses with a 4-year training         | 17  | 27                                     | 62                             |

<sup>a</sup>Cost per graduate, by type of graduate, times the number graduating in 1994. No correction is made for the value of the services rendered by nursing students.

Two findings are notable about these alternatives. First, even assuming that Peru adopted a policy favoring the three-year curriculum, the number of nursing schools would have to be increased enormously (from 17 to 57) to reach the modest target of a 1:1 doctor-nurse ratio by 1994. Indeed, if the population growth rate does not decline or the physician-population

ratio improves more rapidly than assumed, the number of new schools required will be even greater. Secondly, by 1994 it would cost about 200 million soles less per year (\$7.5 million) to adopt the shorter curriculum for all the new schools as compared with the longer one. Over 80 percent of the saving would result from the lower salaries paid and the rest from economies in education.

Therefore, both in terms of cost and the number of schools required, a policy emphasizing the shorter curriculum is preferable. In the search for an adequate balance between the two curricula, it is important to recall the original, and still valid objective of providing some nurses with a university training: to provide an academic basis appropriate for the future leaders of the profession. By using these nurses, many of whom will require postgraduate training, in key administrative, research and teaching positions, it is hoped that the productivity of the entire profession can be improved.

How many "leaders" are necessary and at what point will "leadership training" become so widespread that irresistible pressures will develop to convert all schools to a longer curriculum. While no precise answer can be given, empirical judgment suggests the proportion probably lies somewhere between 15 and 30 percent. Since a policy against opening any more four-year schools for the next several decades is unrealistic, a reasonable alternative might be to open three- and four-year schools in a ratio such as 4:1. Adopting this policy would ensure that more than one fourth of all active nurses would have the longer training by 1994 (Table 11-2).

There is yet another reason to favor a policy emphasizing the shorter nursing curriculum. For years to come Peru must depend on large numbers of

auxiliary personnel, most of them with less than a completed secondary education. If the level of professional nursing education is raised too rapidly, the wide gap that already exists between professional and auxiliary nursing personnel will be made even greater. Should this occur there is a real danger that the nursing profession may lose its vocation of service, becoming instead a new corps of administrators and supervisors. Changes in the dominant pattern of nursing education should, therefore, move in parallel with those taking place among auxiliaries.

The interest generated in the new university nursing schools must not be translated into a depreciation of the shorter program. Although eventually all schools might profitably shift to a four-year curriculum, a great deal can be gained through improvement in the hospital schools. As noted in Chapter 5, nursing schools have tended to exploit their students for the provision of services. If this practice were sharply reduced, ample time could be made available for curriculum reform.

No standards were elaborated for the number of nurse specialists required. As much as possible the need for lengthy postgraduate courses should be minimized by strengthening the basic curriculum in those subjects most essential to Peruvian health conditions. These would include public health, maternal and child health, health education and the social sciences.

How fast should nursing education be expanded? If the smaller demand model were adopted, the 1984 target of 9200 nurses could be attained by opening nursing schools with entering classes of 40 students each in 1970, 1972 and 1974.

An alternative approach would be to ignore the specific 1984 demand projections and instead increase nurse output to the maximum possible. This

policy recognizes that any feasible 1984 nurse supply would still be distant from a desirable ratio between medical and nursing personnel and hence the production of nurses should not be limited by a standard that could otherwise be exceeded. Furthermore, since there is a substantial measure of substitutability among nurses, auxiliary nurses and midwives, any "excess" attained in the nurse supply (over the demand called for by a specific sectoral growth model) could be compensated for, if necessary, by a reduction in the other personnel categories.

The objective of a 1:1 physician-nurse ratio in 1994 provides a useful basis for planning. According to the estimates given in Table 11-2, and assuming a 4:1 ratio between the three- and four-year schools, a new school should be opened annually from 1969 to 1975, two schools a year until 1985, and three schools a year thereafter. Although this rate of expansion is high, it does not appear excessive assuming proper advance planning to anticipate faculty requirements. With Peru still adjusting to the impact of seven new university schools in a three-year period (1964-67), more than one new school annually should not be attempted during the next few years. Later on, however, it might even prove feasible to open two schools annually as early as 1975 or 1974. The added output thus gained would help compensate for the likelihood of a smaller intake during the early years of new school operation than the 40 students assumed.

If a policy of maximum nurse output were adopted, supply would equal about 10,800 in 1984. This number would meet the requirements of the larger demand model and exceed by 1600 those of the smaller ones. In the latter event, and depending on sectoral cost trends, these extra nurses could either be regarded as "additive" or "substitutive". If they were additive, no

change would be made in the rate of auxiliary training and the nurses would be used to enrich the staffing ratios adopted for the different types of institutions. First priority should be given to assigning a nurse to each medical post (720) and secondarily, to strengthening maternity care (to be discussed in the section on midwives). The additional salary cost of the nurses would be about 110 million soles in 1984, or a 0.04 percent increase in the G.N.P. allocation to health.

Alternatively, if it became evident in the 1970's that sectoral costs were rising excessively, a compensatory reduction could be made in the rate of auxiliary training. Adopting this "substitutive policy", a decrease in the number of auxiliaries employed in 1984 from the projected 24,000 to about 21,500 would result in no change in the sectoral cost.

In concluding this section, three key determinants of the future nurse supply merit special emphasis. First, by 1984 a one percent change in the retention rate of graduate nurses will result in a 160 difference in supply. A two percent increase was assumed during the 1964-84 period. If increasing prosperity tends to lower rather than raise female participation in the labor force, nurse output must be expanded even more. The importance of attracting men into nursing as one means of increasing the retention rate has already been mentioned.

Second, the supply projections assume that both the existing and new schools will average about 40 entering students in the future, as compared with 30 in 1964. Smaller schools than those projected will increase the difficulty of achieving qualitative and quantitative improvements in supply.

Third, for most situations the doctor-nurse and nurse-bed ratios are better indicators of the adequacy of supply than the nurse-population ratio.

Accordingly, unless political and health authorities act with restraint in the opening of new medical schools and hospitals (until physicians and beds are optimally productive), the supply of nurses will continue to run a losing race with demand.

### Midwives

The essential problem facing Peruvian midwives is, paradoxically, one of definition. At the level of generalities, the midwife's responsibilities are self-evident. But beyond this point, there is little agreement about what the midwife should do and how she should do it. Unless and until important issues are resolved such as the midwife's level of function, her locus of activity, and the extent of governmental responsibility for maternity care, planning can go little beyond a review of alternatives.

In undertaking such a review, it is essential to recognize that public sector policies will be a deciding factor in how midwifery evolves. Given Peruvian circumstances, private practice is almost certain to remain a relatively minor source of employment. Rural private practice has no more appeal for the trained midwife than for other professionals, and in urban areas she must compete both with free government hospitals and private physicians who charge little more than she does. Likely a large cut in fees could change the demand for midwives' services, a very improbable event in view of the low retention rate already observed among graduates.

The public sector midwife has traditionally been hospital-based, a pattern which the demand model assumes will continue. If this indeed is the case, there seems little justification to change school output; even assuming only 60 percent of the maximum projected supply of 1900 midwives can be induced into salaried employment, there will be enough to satisfy

both public sector and private hospital needs. With most young midwives preferring steady employment over the uncertainties of private practice, the public sector can expect to lay first claim against the available supply.

Some health authorities, while accepting the midwife's role in the hospital, believe she should also be used in the community. Based in a health center or medical post, she would assume two important and complementary responsibilities for the area served: the direct provision of maternity services, and the training and supervision of indigenous midwives. Persons favoring a community-oriented midwife consider still distant the day when modern maternity care will be available throughout Peru. They maintain that the only interim solution is to improve the level of care given by the empiric, and that the trained midwife is the logical health professional to assume this new responsibility.

If government policy favored this latter viewpoint, the demand for midwives would outstrip supply. For example, the following program commitments might be postulated:

- (1) Hospital and outpatient clinics. The 900-1000 midwives required according to the demand model could presumably meet the routine maternity care needs of about 180,000 pregnancies per year, or almost 50 percent of the estimated number of urban births in 1984.
- (2) Home care in urban working class districts. About 200 midwives working out in hospitals and health centers could take care of almost 40,000 deliveries in working class families. The demand for costly hospital care would thus be reduced while at the same time the dangers of unqualified maternity care avoided. The

remaining 150,000+ urban births could be cared for by either public or private sector physicians.

- (3) Medical posts. One midwife could be assigned to each medical post serving a community with 300+ births per year. The approximately 400 midwives required could care for, directly or indirectly, almost 150,000 rural births. About half of the remaining 250,000+ births would receive limited supervision at the level of the health post.

Based on these standards, the public sector would require almost 1600 midwives by 1984, this personnel to cover the professional care needs of over 40 percent of Peru's births.

This level of maternity care, however attractive, would be very difficult to attain by 1984 without substantial modifications in the way midwives are trained. Assuming a total sectoral requirement of 1800 midwives, a 30 percent student attrition, and a 70 percent retention of new graduates, the annual number of entrants during the period 1969-80 would have to be increased from 60, as projected, to almost 200. With both schools experiencing difficulty in completing their enrollments, this level of expansion would be almost impossible to achieve in the foreseeable future.

One way to make the expanded maternity care program feasible would be to supplement scarce midwifery personnel with auxiliaries and eventually, nurse-midwives. A reasonable scheduling might be as follows:

- (1) Increase the output of midwives consistent with the number of qualified applicants. (Unless the Ayacucho school can admit a minimum of about 25 students, it should be closed or converted into a nursing school. Obviously, a first priority should be to gain Ministry of Health recognition for the graduates.)

(2) Adopt measures to increase the retention of young midwifery graduates. Likely all that would be necessary is to make salaried jobs available on graduation.

(3) Annually select 50 to 75 of the more able auxiliary nurses for additional training in midwifery. On graduation they would be expected to provide selected elements of basic pre- and post-partum care to normal women under the direct supervision of a professional. Their training would include partial care only to the extent of preparing them to act in precipitous deliveries. The course should last no more than six months and might be modeled after a similar program offered in Chile. Once a total of about 700 auxiliaries had been trained (for priority assignment to the medical posts), future courses would be given only as necessary to provide for replacements. Gradually, as the number of professionals approached an adequate level, the number of auxiliaries would be allowed to decline.

(4) As the supply of nurses improved, and particularly in anticipation of stationing nurses at the larger medical posts, three- to six-month postbasic courses in midwifery would be offered. Assuming this program is initiated in the early 1970's, a reasonable target for 1984 would be about 500 nurse-midwives.

Within this scheme the trained midwife would continue to occupy a key role. During the first few years she would continue to work primarily in hospitals but would also assume the major responsibility for auxiliary training and supervision. As additional midwives became available, they could be assigned

first to work in urban working class areas and secondly, in the larger medical posts.

What is the probability that an expanded program of maternity care would be accepted by both the government and the profession? At the present time, very slight. From the government's point of view one of the most frequent reasons cited is the inappropriate training midwives receive,<sup>a</sup> not only for community services but also for work in hospitals.

The Lima maternity hospital offers unique teaching opportunities in terms of the volume of maternity services provided. However, relatively few maternities have been built in Peru and it seems likely that the future needs for obstetrical beds will be met through general hospitals. In the Lima maternity, the ratio of midwives to nurses is almost ten to one, whereas in the general hospital the ratio is almost the reverse. Hospital administrators interviewed during the manpower study observed that not infrequently they had difficulty in getting midwives to develop effective working relationships with other hospital personnel, particularly the nursing staff. In their view, this was largely due to the different patterns of work organization that were called for in the Lima maternity and the general hospital. The lack of sufficient nursing preparation was also commented upon, some hospital officials noting that in terms of actual duties performed, midwives spent most of their time providing what was really nursing care for pregnant and post-partum women. Partial care -- the dominant theme in midwifery training -- played a relatively small part.

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<sup>a</sup>Very little qualitative information was available about the school of midwifery at Ayacucho. Most remarks were therefore limited to the National School of Midwifery in Lima.

As a result of her almost exclusive confinement to a hospital environment, the student midwife has traditionally received little preparation in subjects such as health education, nursing, care of the newborn, vital statistics, the behavioral sciences, public health, and even in some aspects of prenatal and postpartum care. Only since 1963 have students been offered a short one-month rotation through the Rimac and Calao health centers, and as of 1964 they still had no opportunity to conduct home deliveries under supervision.

For its part, the leadership of the midwifery profession has strongly resisted any proposals for change that might -- in its view -- threaten the profession's identity. In recent years this has been most often manifested by the profession's opposition to any strengthening of nursing instruction at the Lima school, it being feared that this might somehow eventually result in the loss of the right to attend deliveries without medical supervision. A proposal to give auxiliaries or nurses training in obstetrical care would likely be viewed with even greater concern.

The sensitivity of the profession to any change that might adversely affect its status and prerogatives has certainly made it difficult to conduct an impartial review of Peru's needs for maternity care. More important, however, has been the isolation of midwives and their schools from developments in the rest of the health sector. Virtually no opportunities exist for midwives to obtain postgraduate training and thereby gain a broader perspective of Peru's health problems and their role in solving them. As of 1964 no representative of the profession was in an advisory position in the Ministry of Health or any other governmental system of health care. At the Lima school, opportunity for contact with the community beyond the confines

of the hospital is negligible. School officials there are mostly part-time and educational policy must often take second priority to the pressing and politically sensitive problems of the maternity hospital.

Confronted with such barriers to effective communication with the rest of the sector, it is not surprising that the midwifery education has often lacked decisiveness and direction. Despite ample basis for discouragement, there is also reason for hope. The School of Public Health in Lima started discussions in 1964 with both training institutions and employers to explore various measures that might be used to strengthen the training of midwives and nurses in the community aspects of maternal care. The declining enrollments of recent years have been an important stimulus to the schools to begin defining their long-range objectives and plans. The Pan American Health Organization has undertaken a hemisphere-wide study of midwifery education as a basis for assisting schools throughout Latin America in improving curricula and educational procedures. Efforts such as these can help strengthen the contribution which this essential manpower resource makes to Peru's health services.

#### Technical Personnel

After years of neglect, the danger now exists that technical training will be given too much, or more accurately, inappropriate emphasis. To avoid the problems that may result, careful educational programming is required. Four topics merit special attention.

Rate of Training. The output of technicians must be closely adjusted to the capacity of the sector to absorb them. Since private sector demand is small, government job openings will be decisive in fixing enrollments. At this level of training there is little margin for

error. Unlike the professional, the technician cannot afford to be marginally employed for a period of years; either he will be immediately given work or, as happened with the sanitary inspectors described in Chapter 7, he will probably be lost to the health sector.

Retraining. Training targets should take into account the need to upgrade existing personnel as well as to staff new facilities and provide replacements. In this regard, educational programming might call for the following: (1) an inventory of employed technicians to determine precise needs for additional training; (2) development of a corps of "technician replacements" able to fill jobs on a temporary basis while the regular incumbents receive training; (3) expansion of training capacity to accommodate those undergoing retraining; (4) subsequent reduction in training capacity back to the requirements of new facilities and attrition once most of the deficit is corrected.

Training Responsibility. In the absence of strong technical schools, most of Peru's technicians will likely be trained by either the professional faculties or service agencies. To avoid having too many training programs in one discipline and none in another, there should be close coordination among all institutions interested in technical training. Accordingly, physical therapists might be trained by one medical school, laboratory technicians by another, dietitians by an insurance program, and so on. Indeed, the service agencies might wish to contract among each other and with the educational institutions for the training of a specified number of technicians. Such an arrangement, by formalizing the obligations of each party, could do much to facilitate the efficient use of training resources.

Length of Training and Curriculum. The problems caused by over-training technicians, particularly in a university setting, have already been mentioned. Training capacity is reduced, the costs of training and of employment are increased, job expectations exceed realities and many are apt to leave the health sector. As a general principal Peru should probably not give more than two years of formal training to any technician category until most of the current training deficit has been corrected. Course length should be primarily determined by the time needed to teach students to perform defined functions in Peruvian health facilities, and not necessarily what is done in other countries. As much as possible course content should be standardized among the several institutions preparing the same type of technicians and similar certificates awarded. Within any one technician category a clear distinction should be made between the different personnel levels, and the number of levels kept to the minimum possible.

Implicit in these considerations is the need for a far higher degree of inter-institutional coordination than has so far existed. To attain this objective, one possibility might be for the Ministry of Health to sponsor a Permanent Advisory Committee on Technician Training. With representation from all interested training and service institutions, this committee could develop the quantitative and qualitative standards necessary to guide educational programming. Concurrently, a certification-registry system should be developed to facilitate measurement of the current supply of technical manpower and to provide technicians with incentives for improvement.

Laboratory Technicians. The two 1984 demand projections for laboratory technicians are 1900 and 2100, compared with a 1964 supply of about 600. Of the latter figure, only about 200 had three or more months of training.

In the Fourth Report of the W.H.O. Expert Committee on Health Laboratory Services, four major categories of laboratory personnel were recognized:<sup>a</sup>

| LEVEL | RECOMMENDED TITLE   | APPROXIMATE AMOUNT OF TRAINING           |                                 |
|-------|---|--|---------------------------------|
|       |   | General Education                        | Laboratory Technology           |
| A     | Graduate Technician   | Completed secondary                      | 4-5 years in a college or univ. |
| B     | Non-Graduate Certified Technician   | Completed secondary                      | 2-3 years                       |
| C     | Certified Assistant Technician<br>(multiple-skill laboratory assistant)   | Preferably through 2nd year of secondary | 6-12 months                     |
| D     | Non-Certified Assistant Technician<br>(single-skill laboratory assistant) | Completed primary                        | 2-6 months                      |

The Report includes a model curriculum for training level "C" technicians in one year (nine months of course work, two months of in-service training).

From a review of the curriculum content it is evident that a technician of this level, working under periodic supervision and guided by appropriate work manuals, could satisfy the needs of all but the largest (150+ beds)

<sup>a</sup>World Health Organization, Technical Report Series, No. 345, p. 5. The precise length of training for personnel below level "A" is not specified but is inferred from the text of the report.

hospitals and polyclinics. With considerably less skills required at the level of a medical post, course time could likely be cut in half.

At the largest health facilities, besides an adequate staff of level "C" technicians, it would also be appropriate to use one or several at the "B" level with a maximum of two years of preparation. Once the large deficit of laboratory personnel had been reduced nationally, it would then be appropriate to begin training a limited number of technicians up to level "A".

Table 11-3 suggests a rate of training adequate to meet the 1984 requirements (1900 technicians) of the smaller demand model. For the larger demand projection, the number of entrants should be increased by about five percent. In meeting either target priority should first be given to those requiring one year or less of training, emphasis later being shifted in favor of the longer courses.

During the next few years responsibility for training the two-year technician could be vested in the San Marcos Faculty of Medicine and perhaps one other professional faculty. By the latter 1970's, when most of the demand for this level of personnel has been satisfied, one institution might begin accepting students for a four-year degree course (level "A") while the other continues training those at the "B" level in a somewhat longer course than previously given (e.g., 30 months).

About three courses of the one-year type should be established as soon as possible. Appropriate affiliations would include a major teaching hospital, the National Public Health Laboratory, or a technical school.

The six-month course could be offered in four or five regional hospitals on a rotating basis. Despite some economies of teaching personnel

**Table 11-3. RATE OF LABORATORY TECHNICIAN TRAINING ADEQUATE TO SATISFY THE 1984 PROJECTED DEMAND (MODERATE GROWTH MODEL): By Length of Training: Peru**

| PERIOD  | ENTERING STUDENTS PER YEAR, BY LENGTH OF COURSE <sup>a</sup> |                 |                 |
|---|--|-----------------|-----------------|
|   | Six-month course   | One-year course | Two-year course |
| 1964-68 <sup>b</sup>                              | 10   | 10              | 5               |
| 1969-73   | 75   | 75              | 30              |
| 1974-78   | 50   | 75              | 30              |
| 1979-83   | 20   | 75              | 30              |
| Number of Active Technicians in 1984 <sup>c</sup> | 700  | 900             | 300             |

<sup>a</sup>Assumes a 10% student attrition in the two shorter courses and a 20% attrition in the longer one.

<sup>b</sup>For the entire period assumes a total of 50 entrants each for the two shorter courses and 25 entrants for the longer course. Most are presumed to enter training in 1967 and 1968.

<sup>c</sup>Assumes that 70% of the 200 "trained" technicians active in 1964 will remain active in 1984, and a 85% retention rate for all those trained during the 1964-83 period. If the proportion of women studying technology is higher than about 40%, the retention rate for new graduates should be lowered to 75%.

and the ease of subsequent personnel upgrading, there should probably be no overlap between the six-month and one-year courses. After taking the same classes for a few months it would be difficult to separate the students, sending some to begin work while others continue their training in order to qualify for a higher position.

X-ray Technicians. According to the smaller demand projection, the number of active x-ray technicians should increase from about 233 in 1964 (of whom less than 70 were "trained") to 1100 in 1984. The larger projection would raise the demand to over 1200.

In projecting training requirements, the same assumptions were used as in the case of one-year laboratory technicians. Although it may be desirable to lengthen training to 18 months or even two years by the late 1970's, such a curriculum at the present time would make it difficult to achieve the 1984 target. The approximate rate of training required is to satisfy the smaller projection (1100) is shown below:

| PERIOD               | ANNUAL NUMBER OF ENTERING STUDENTS |
|----------------------|------------------------------------|
| 1964-68 <sup>a</sup> | 10                                 |
| 1969-73              | 50                                 |
| 1974-78              | 90                                 |
| 1979-83              | 120                                |

<sup>a</sup>Assumes 2 entrants annually at the Anglo-American Clinic, 10 at a two-year program scheduled to start in 1967 at the Policia Hospital, and 20 entrants in another course to be started in 1968.

The larger demand projection (1200) would require increasing the annual number of entrants by 10 in each of the last three five-year periods.

Therapists. By 1984 more than 425 physical therapists will be required. Three-year courses in this discipline were started in 1961 by the Hospital Obrero and in 1964 by the Hospital Militar. By 1969 these two programs will have trained almost 80 therapists. Assuming the same attrition and retention rates as were used to project nurse supply, about 20 students should be admitted annually in the 1969-71 period, 40 students per year during the next five years, and about 55 per year thereafter. Although such a change might prove difficult, the possibility of reducing the length of training to two years should be considered by the schools.

The estimated demand for occupational therapists is about 100. Assuming a two-year course could be started in 1969, about 25 students should be admitted in alternate years through 1981 to meet the desired target.

#### Auxiliary Personnel

Consistent with the public sector trend of requiring virtually all auxiliary categories to take the same basic six-month course, this section makes no attempt to distinguish among the various subspecialties. It is presumed that the need for specialized auxiliaries in fields such as midwifery, public health, and for the operation of health posts will be met, as required, through short post-basic courses in these disciplines. Pharmacy auxiliaries have already been considered.

Depending on the demand projection adopted, Peru will require between 25,000 (including sanitarios) and more than 28,000 auxiliaries by 1984. Of

these, it is assumed that all but 1500 must be prepared by the public sector.

In 1964 the auxiliary supply totaled about 9100, of which 3200 were considered "trained" according to the standard of three or more months of formal instruction. Future training requirements, shown in Table 11-4, are estimated by:

- (1) Subtracting 60 percent (assumed 1984 retention) of the 3200 trained auxiliaries active in 1964 from the projected public sector demand;
- (2) Calculating the number of auxiliaries that must start training, assuming the attrition and retention rates shown, to provide the balance of the estimated demand (i.e., 21,600 and 24,600).

Table 11-4. APPROXIMATE RATE OF AUXILIARY TRAINING REQUIRED TO MEET 1984 PUBLIC SECTOR REQUIREMENTS: by Demand Projection: Peru, 1964-84

| PERIOD<br>(Mid-year) | ENTERING STUDENTS<br>PER YEAR <sup>a</sup> |        | % REMAINING<br>ACTIVE IN<br>1984 | COURSES PER YEAR <sup>b</sup><br>(by Demand Proj.) |       |
|----------------------|--|--------|----------------------------------|--|-------|
|                      | (by Demand Proj.)                          |        |                                  | Moder-<br>ate                                      | Rapid |
|                      | Moder-<br>ate                              | Rapid  |                                  |  |       |
| 1964-69 <sup>c</sup> | 540  | 600    | 65                               | 14   | 15    |
| 1969-74              | 1,200                                      | 1,360  | 70                               | 28   | 34    |
| 1974-79              | 1,900                                      | 2,300  | 75                               | 48   | 58    |
| 1979-84              | 2,800                                      | 3,000  | 80                               | 70   | 75    |
| 1964-1984            | 31,800                                     | 36,300 | -                                | 160  | 182   |

<sup>a</sup>Number of entrants includes untrained personnel already in service (who presumably require training) as well as new personnel not yet employed. It is assumed that 90 percent of the entrants will complete the six-month course.

<sup>b</sup>Assumes 40 entering students per course.

<sup>c</sup>Based on approximate numbers trained through mid-1967 (1400) and assumed intake of 700-800 thereafter.

<sup>a</sup>Projected private sector demand is for 2000 auxiliaries, of which an assumed 500 will have been trained by the government. The decision of whether or not to train the remaining 1500 will be up to the individual private institutions.

These objectives, while perhaps not completely attainable, do not appear utopian. In the early 1960's Chile's National Health Service trained somewhat more auxiliaries per year in a nine-month course than Peru would have to train in a shorter course ten years later. The number of instructors needed would not be great: assuming that each class of 40 requires a full-time team of three nurse-instructors, and that each team would average almost two classes per year, about 30 nurses would be occupied in auxiliary training during the remainder of the 1960's and a maximum of 150 by 1984. Similarly, the supply of girls with at least two years of secondary education appears adequate in relation to these targets. According to National Planning Institute data, there were 23,000 girls and 34,000 boys enrolled in the second year of general studies in 1964, the total having increased by about 4500 annually in the preceding five years. The 1970 requirements for auxiliary training would amount to less than seven percent of the number of girls then expected to terminate their secondary school education at the second, third or fourth year level.

In planning to meet the desired targets, it is essential to keep the training programs both flexible and simple. Training objectives should start high since they can always be scaled down later. If cuts must be made, in most cases it is preferable to shorten the courses (e.g., from six to four months) than to eliminate the training requirements altogether. Later, as the training capacity expands, those with abbreviated preparation can be given additional course work.

By developing a simple and logical training sequence Peru can help reduce the rigidities that otherwise occur with excessive and premature specialization. The first step up the hierarchical ladder -- gradually

imposed over time -- should be the completion of the basic auxiliary course. Criteria for further advances should include, as appropriate, additional short refresher and specialty courses. Auxiliaries lacking sufficient general education should be encouraged to take adult evening courses, perhaps compensated in part by release time from work as is done in Chile. During the next ten or more years, and except under well-defined circumstances, auxiliaries should not be highly specialized. As the first phase of upgrading nears completion, specialty courses could be lengthened and some of the best auxiliaries allowed to advance even to the point of entering a professional school. By giving those with good native abilities a chance to progress, employee morale and performance would be enhanced.

The logistics of setting up the necessary courses should not present undue difficulties. Already courses are given to prepare personnel before opening a new facility and these should be continued. Additionally, courses should be offered by mobile instruction teams in the larger public sector facilities operating with many untrained personnel. Most courses might be given in 10 to 15 regional hospitals acting as training centers for the smaller facilities within their jurisdiction. Besides offering the six-month basic course on virtually a continuous basis, these hospitals could also give the short (one to four weeks) orientation course for those requiring additional preparation. Lastly, the auxiliary training program of the armed and police forces, if made approximately compatible with civilian programs, could make an important contribution towards achieving the desired targets.

Other Personnel

Sanitary Engineers. To meet a projected public sector demand of 600+ sanitary engineers in 1984 Peru will have a potential supply of over 700. However, since a substantial number of engineers will be employed in the private sector, it may prove difficult to completely satisfy the requirements called for in the model.

For several reasons a further increase in supply (beyond 700+) does not now appear indicated. First, excessive losses to the private sector can be more economically counteracted by raising government salaries than by trying to saturate demand through increased output of graduates. Secondly, it seems quite likely that the standard adopted of one engineer per three million soles of capital investment can be lowered by 1984; economies of scale, higher educational levels of project employees, and increased availability of assistant engineering personnel may make it possible for one engineer to supervise the technical aspects of a much larger investment. If so, public sector demand would be decreased by over 100.

Sanitary Inspectors. According to the standards used (one inspector per 10,000 urban inhabitants and one per medical post), the Ministry of Health will require about 1800 sanitary inspectors by 1984, compared with less than 150 employed in 1964. Assuming a 10 percent student attrition and an 85 percent retention of those trained, the annual intake, by five-year period starting in 1964, should average 55, 90, 130 and 170. Alternatively, to raise the urban standard to the desired ratio of 1.7 inspectors per 10,000 population would require increasing the annual number of entrants in each five-year period to 80, 130, 180 and 240.

The lower target, and perhaps even the higher one, could be met if the Ministry is prepared to create the necessary positions. The School of

Public Health's original plans in 1963 called for 100 per year until it became evident that the Ministry could not then absorb that number.

Before making a major commitment to expand the number of sanitary inspectors, the Ministry and School of Public Health should evaluate the effectiveness of this type of personnel as now utilized. In the absence of unacceptably high penalties for infractions, can the sanitary regulations be enforced through inspections, regardless of frequency? What is the cost per consistently used latrine installed? Will the number of families using latrines continue to grow after several years of a latrine program, or, considering the short useful life of a latrine, will the program just cover the need for replacements? What other activities might provide a greater return for the investment? Depending on the findings of such a study, the quantitative and qualitative requirements for environmental sanitation personnel might change substantially.

Social Workers. The demand projections estimate a requirement of about 800 social workers in 1984, compared with about 140 in 1964. If most of these personnel are to be four-year graduates, it is unlikely this target can be met. By 1984 the total supply of graduates will likely be between 1500 and 1800, of which no more than about 70 percent (1100-1300) can be expected to be active at any given time. Private industry outpays government positions by a substantial margin, and even were this differential to disappear, the agriculture and education sectors would vigorously compete with health for the available supply.

Alternatively, ample use could be made of non-graduate social workers and of social work auxiliaries working under the supervision of those with completed training. Since the usual functions of social service in a health facility -- verification of economic status and making arrangements

related to hospitalization and discharge -- do not require professional personnel, this policy should not present any unusual difficulties.

Regardless of the ratio of professional to non-professional personnel used, approximately the following number of new social worker positions should be added annually to attain the 1984 target of 800.

| PERIOD  | NUMBER OF NEW PERSONNEL<br>ADDED PER YEAR |
|---------|---|
| 1964-68 | 20  |
| 1969-73 | 30  |
| 1974-78 | 40  |
| 1979-83 | 50  |

Dietitians and Nutritionists. The estimated 1984 requirement for dietitians and nutritionists is about 375, more than three times the 113 found to be active in 1964. To project training requirements, the following assumptions were made:

- (1) That 47 graduates will result from students admitted prior to 1968;
- (2) A student attrition of 15 percent in the three-year program;
- (3) Cohort retention rates similar to those assumed for nurses (80%, 65%, 50% and 45%);
- (4) All nutritionists will have the basic course in dietetics.

Based on these assumptions, about 30 students should be admitted in either 1968 or 1969, 30 per year should enter training during the 1970-76 period, and 35 per year thereafter. The number of dietitians requiring post-graduate training in nutrition should be the subject of future study.

Health Educators. The estimated 1984 demand for health educators is approximately 225, compared with a 1964 supply of 22. Assuming an overall

retention of 75 percent of those trained, past and future, about 280 should be prepared during the 1964-84 period, or almost 15 per year.

Administrative Personnel. Research, whether applied or basic, is often criticized as being based on what is measurable and not necessarily on what is important. The failure of most manpower studies to consider the need for competent administrative personnel certainly merits this criticism. When the Peru study was designed, this category was excluded, in part because of the difficulty of defining what administrative skill levels were required, but even more because it was tacitly assumed that responsibility for training belonged to the general education system alone.

The first reason has considerable validity. Except perhaps for senior non-medical administrators, statistical, medical record, and accounting personnel, it is not practicable to attempt functional classification of the myriad of administrative categories found in a large health system.

The second reason, while true in the limited sense, tends to overlook the improvements that health institutions can make in the quality of administrative personnel. Little is gained by rationalizing administrative organization if parallel steps are not taken to better qualify people for their jobs. Appropriate measures would include brief orientation and refresher courses, manuals of procedures, and release time for additional general education. To provide the necessary incentives, personnel policies should clearly define the requirements for advancement and salary scales should reflect responsibilities, performance and training more than longevity in service.

Already several public sector health systems have made a start on such reforms, though to have an observable impact, a much greater

Effort will likely be necessary. The benefits of a broad scale attack on administrative inefficiency would far outweigh the costs. Not only would more resources be available to employ health workers, but their time could be used more effectively.

Chapter 12

ISSUES IN HEALTH MANPOWER PLANNING

Health Care Organization

Manpower policy cannot be divorced from health care organization. Organization affects the efficiency with which services are produced, and their cost in manpower, money and materials. As has been evident throughout this monograph, the wide variation in the staffing patterns used in the different systems of health care is one of the most conspicuous findings of the manpower study. These differences will not disappear immediately, nor indeed should they. Certain groups, notably the economically productive, need preferential access to health care if the nation is to attain a maximum rate of development. And the variations that exist among different segments of the population with respect to the accessibility to health services, and to economic, social and political power, are facts of life that cannot and will not be abolished by any society in the foreseeable future.

But to recognize the inevitability of institutionalized differences in the amount of health care available to different population groups does not lessen the need to carefully weigh their effects on the achievement of national objectives and the efficiency of resource utilization. Viewed from the perspective of social and economic development, excessive concentration of resources for the benefit of only a small proportion of

the population can only help to maintain inequities that have retarded Peru's search for national identity and purpose. Only when all Peruvians are given relatively equal opportunities to be educated, to enjoy better health, to be gainfully employed, and to participate in the political process can these objectives be fully achieved.

Viewed from the more limited perspective of the health sector, the enormous concentration of scarce resources in the social insurance funds and the armed and police forces' system can be challenged solely on the grounds of efficiency. Would the overall output and quality of health services increase if existing resources were organized so as to reduce the wide variation in the staffing ratios used in the several health systems? While a quantitative answer cannot yet be given, there is good reason to believe that this would be the result, even if certain population groups were to retain the same degree of preferential access to health care as now is the case. Ways to improve the rationality of resource allocation within the several systems of health care should receive the urgent attention that it requires.

The most effective means of rationalizing the use of scarce health resources, and indeed the one most consistent with the objectives of the Peruvian constitution, is that of integrating all public sector health activities into a national health service. As has been pointed out by Roemer<sup>44</sup> in his study on Medical Care in Latin America, such an integrated system, even though "open" to all, could be so designed as to give preferential

access to those segments of the population judged most essential to development.

Though the objective of a national health service is useful as an eventual goal, it is probably not realistic to assume its creation in the near future. The insurance funds are well aware of their responsibilities to insured beneficiaries and believe, perhaps with good reason, that the combined resources of all public sector health agencies and ministries would not be sufficient to meet the increase in demand that an integrated health system might produce. Careful study of the economics of a national health service and of its capacity to meet the demand for health care are required before the advantages and disadvantages of this policy can be realistically considered.

Other measures, short of the creation of a national health service, could be used to improve the rationality of manpower utilization. An important objective, adopted in 1965 and due to be realized by 1968, is the equalization of salary scales throughout the public sector (excluding the charity hospitals). The task of the Ministry will be doubly difficult; not only will it have to raise its own salary scales to a level comparable with those in the two funds, but it will also have to equalize, from a substantially lower starting level, the salaries paid to charity hospital personnel absorbed into the Ministry. The policy of equalization will consume a large proportion of the annual increments in public expenditures for health, thus making it difficult during the next few years to add new staff and upgrade facilities. These adjustments

are essential; however, if the public sector is to avoid the deleterious effect of different salary scales paid by the several agencies. Both the administration and employees of the social insurance funds will deserve great praise if they can keep further salary increases to a minimum until the Ministry of Health has completed the difficult period of readjustment.

Even more important than salary equalization is the actual redistribution of manpower among public sector facilities. If the insurance funds are able to create twice as many nursing and medical positions for a facility of a given size than, say, the Ministry of Health, the fact that both institutions offer the same remuneration will count for little; the insurance funds will still, other things being equal, be twice as well staffed as is the Ministry.

Probably the most effective way to improve the distribution of personnel without infringing on the identity and responsibilities of each administrative system is by means of inter-system contracts for health care. This mechanism has already been used to a limited degree by the insurance funds but should be employed much more frequently now that the new Ministry hospitals offer standards of comfort and care comparable with what the funds are able to offer in their own facilities. This approach would offer a number of important advantages to all parties. First, agencies such as the insurance funds and the armed and police forces' health services could offer their beneficiaries better coverage in communities where the client population is too small to justify maintaining an agency-owned facility. Second, these agencies could, in a number of instances, make their own

unused beds available to each other on a contractual basis while at the same time reducing their net operating costs. Third, contractual arrangements among the different systems of health care could have an important effect on the attitudes of health personnel in general. Instead of each viewing his job within a narrow frame of reference, determined by his employer and client population, the perspective would be broadened to include other agencies and the needs of all Peruvians. A fourth and very important effect of the widespread use of service contracts would be to strengthen those institutions currently with insufficient manpower and other resources.

This last-named effect merits further comment. With additional income accruing from service contracts, Ministry of Health and charity hospitals could improve the quality of care offered. Indeed, it might be possible over a period of time to assign some of the professional and auxiliary personnel currently working in agencies with favorable staffing ratios to those in a less advantageous situation - in return for a specified amount of care. This type of arrangement could be particularly beneficial in improving the charity hospitals.

The importance of finding ways to strengthen the charity hospitals should not be overlooked on the assumption that this problem will disappear as soon as they are absorbed by the Ministry of Health. First, these hospitals may not be transferred to Ministry control with the rapidity anticipated. But more importantly, the deficiencies of most charity facilities are so great that drastic measures will be necessary to correct them. The charity hospitals still operate one-third of the nation's bed

capacity, and could, with proper reinforcement, provide a much greater amount of ambulatory care. The Ministry of Health and the National Health and Welfare fund have, until now, limited themselves to providing subsidies to meet operating expenses and to gradually improve facilities and equipment. These efforts, while meritorious, do not go far enough. More than money and materials, the charity hospitals lack manpower, in both quantity and quality. If the Ministry of Health could undertake a staged program for upgrading key personnel at, or loaning personnel to, charity institutions, an important start on this difficult problem could be made. The Ministry has, of course, its own deficit of qualified hospital administrators, clinical specialists, and other professional and auxiliary personnel. However, even a small infusion of full-time workers, subject to a more rigorous professional discipline and reinforced by a regional Ministry hospital, could have a far greater impact on the quality of care than continuation of subsidies alone.

Paradoxically, the Ministry may have more to gain by supporting the small and comparatively least efficient charity hospitals than the larger ones in provincial and departmental capitals. Already many of these latter facilities are being superseded by new Ministry hospitals and are either being abandoned (a few cases) or converted into chronic disease or tuberculosis hospitals. The current policy of constructing few hospitals with a capacity of less than 100 beds means that it will be some time before new facilities will be available to many towns. By improving the hospital care available at the smaller charity hospitals, and particularly by expanding outpatient facilities and adding public health services where not already available, the Ministry of Health could make

an important contribution to the health of these communities at relatively little additional expense. Patients living in rural areas and small towns would benefit because quality services were more accessible, and the regional hospitals would avoid becoming overburdened providing services to patients better cared for locally.

In considering how organizational changes might improve the use of scarce resources, it is essential to emphasize that such changes need not infringe unduly on the autonomy, standards, and responsibilities of the different systems of health care. Ways can be found to achieve more equitable staffing ratios which can accrue to the benefit of all parties concerned. The search for these opportunities should be one of the major tasks of the planning and programming offices during the coming years.

Health Care Distribution

The Present Situation

The marked concentration of professional health personnel in urban areas has been evident throughout this study. Table 12-1 shows the remarkably consistent twofold difference in the population-manpower ratios between large and small cities, and the more than tenfold difference between small cities and the rest of the country.

Table 12-1. PERSONS PER HEALTH PROFESSIONAL: by Population Group: Peru, 1964

| HEALTH PROFESSIONAL | PERSONS PER PROFESSIONAL, BY POPULATION GROUP |               |              |
|---------------------|---|---------------|--------------|
|                     | 50,000+                                       | 10,000-49,999 | Under 10,000 |
| ALL                 | 300   | 700           | 8,000        |
| Physicians          | 700   | 1,900         | 17,600       |
| Dentists            | 2,400   | 4,400         | 45,300       |
| Pharmacists         | 2,200   | 5,100         | 63,800       |
| Nurses              | 1,200   | 3,500         | 37,900       |
| Midwives            | 4,800   | 8,100         | 72,300       |

Even with the substantial improvements forecast by 1984 in the national population-manpower ratios, it will be difficult to reduce the urban-rural gap unless major urban centers accept somewhat less favorable ratios than prevailed in 1964.

The problem is particularly evident in the case of physicians. According to the moderate growth demand model Peru will require about 13,000 doctors by 1984, or 3,500 more than are necessary to maintain the 1964 national doctor-population ratio of 1:2200. However, if each of the three population groups used in Table 12-1 were to maintain the same ratio in 1984 as observed in 1964, a total of 14,100 would be required. And if the small city ratio were to be improved 25 percent and rural populations were to have one doctor per 10,000 inhabitants, the 1984 physician demand would increase to almost 15,000! Since Peru could not realistically afford to increase the physician supply much beyond the targets presented in Chapter 11 while at the same time improving the balance between medical and non-medical personnel, two alternatives remain: (1) allow the urban-rural imbalance to become even greater or (2) take positive measures to improve distribution despite some deterioration in the physician-population ratio in large cities. If the latter policy were adopted, and assuming that physician supply equaled 13,000 and the small city and rural ratios were improved as postulated, the big city ratio would fall from 1:700 to 1:800. This amount of redistribution need not, however, adversely affect the per capita amount of health care available to urban residents if there are compensatory increases in productivity.

Improved manpower distribution will be both difficult to achieve and of limited effectiveness unless the types of facilities and services available in communities of differing sizes are appropriate to their needs. To cite extremes, for a small community a hospital might be professionally attractive but very uneconomical and not very effective; conversely, a medical post with limited equipment and staff might be economical but be unable to attract and retain qualified personnel.

It is particularly urgent to harmonize community needs and the institutional expression of these needs in population centers of less than 10,000 inhabitants. Above 10,000 the community can attract at least some health resources and in 1964 not one of the approximately 50 population centers in this category lacked either a physician or a hospital. But below 10,000 the situation rapidly deteriorates as is shown in Table 12-2. According to these figures almost all communities with 5000+ inhabitants, and about one-third of those with 2000 to 5000 population had a medical facility, and only about 20 percent of those with 1000 to 2000 had any health facility. Below 1000 inhabitants the proportion with any facility is negligible.

The principal non-hospital health institutions -- the medical post and health post -- were described briefly in the Introduction. For a number of reasons these institutions, as now constituted, are ill-suited to meet the needs of communities of less than 10,000 population. At the level of the medical post the main problems are those of professional isolation and lack of supporting personnel. Being alone, the physician is seldom able to leave his town either to supervise the health posts under his control or to maintain effective contact with the regional health authority.

**Table 12-2: COMMUNITIES UNDER 10,000 POPULATION: Estimated Number, Population, and Number with Medical and Non-medical Health Personnel: by Community Size: Peru, 1964**

| COMMUNITY SIZE<br>(under 10,000) | NO. OF COMMUNITIES <sup>a</sup> | POPULATION (000's) | COMMUNITIES WITH |                  |  |
|----------------------------------|---------------------------------|--------------------|------------------|------------------|--|
|                                  |                                 |                    | One+ doctor(s)   | Health Post Only | No health personnel (excluding indigenous) |
| 5000+                            | 60                              | 470                | 52               | 6                | 2  |
| 2000+                            | 210                             | 630                | 72               | 25               | 113  |
| 1000+                            | 540                             | 730                | 54               | 48               | 438  |
| 500+                             | 1,510                           | 1,010              | 32               | 67               | 1,411                                      |
| 100+                             | 2,820                           | 2,710              | 17               | 79               | 12,724                                     |
| Under 100                        | 63,020                          | 1,470              | 0                | 3                | 63,017                                     |

<sup>a</sup> Adapted from Table 7, p. 17, Bol. de Estadística Peruana: Demografía (Inst. Nac. de Planif., Dir. Nac. de Estad. y Censos, No. 7, 1964). The estimated 1964 population assumed a 2.0 percent growth rate since 1961 for each population category.

Without adequate supporting personnel or knowledge of how to work with rural populations, the doctor finds himself unable to provide little more than elementary medical care. Under such circumstances his professional competence is apt to quickly deteriorate and he is usually anxious to return to the city.

The sanitario working at a health post is in an even more difficult situation. With little training, no assistance, and almost no supervision, it is not surprising that his contribution to health care is, in most cases, very limited.

Both types of facilities are relatively inexpensive, though not so when measured against their apparent ineffectiveness or the number of facilities that might ultimately be needed. Assuming continuation of present trends in the construction of these facilities, over 600 more medical posts and almost 1000 more health posts are needed by 1984. And even were they provided, many thousands of smaller population centers would still be without access to minimal health care. The health needs of rural Peru require re-evaluation and a search made for an improved institutional framework within which these needs can be met.

#### A Policy for the Future

For communities of more than 10,000 population the hospital-health center provides a reasonable pattern for the future development of urban health services. Here, the major problems faced are those of perfecting operations, of creating new hospital-health centers in communities

where they do not presently exist, and of achieving a better balance in the health manpower available to large cities and to smaller towns.

The problems faced by communities of less than 10,000 population are more complex. The root of the present difficulties lies in trying

to meet the needs of communities varying from several hundred to 10,000 inhabitants with only two types of institutions. As a result, the

medical post is frequently located in communities too small to justify the number and variety of health personnel necessary for an effective

program and the health post is located in communities too large for the sanitarium and his limited resources. By displacing the medical post

upwards towards larger communities, the sanitarium or his replacement downwards, and restructuring the health post for intermediate popula-

tions, many of the limitations of the present situation could be overcome.

The Medical Post. For the medical post the implications of such a change would be substantial. Instead of being located in towns with

as few as 2,000 inhabitants, they would be usually limited to towns at least several times as large. With less posts required and larger

populations served, staffing norms could be revised to include dental, nursing and midwifery personnel, and in some cases, additional auxiliary

and medical personnel. As a result of the improved working conditions, the problems now encountered with physician recruitment and retention

should be considerably reduced.

Much more important than the effect on physician morale would be the impact of such a facility on community health. The added personnel would permit a three-pronged approach to the major health problems of the

central town and the surrounding villages; directly through the provision of preventive and curative services to the local population; indirectly through the training and supervision of lay midwives and perhaps other types of indigenous practitioners in the community; and regionally by means of regular trips that the professionals would make to the health posts under their jurisdiction for purposes of personnel training, supervision and the provision of direct services to the local population.

The Health Post. Even more changes would be made in the health post. Located in somewhat larger communities (at least one thousand inhabitants) than at the present time, the health post would have a core staff of a director, auxiliary nurse, auxiliary midwife, auxiliary sanitary inspector, immunizer, perhaps a pharmacy aide, and service personnel.

With narrowly defined functions and regular supervision by medical post personnel, such a team of public health auxiliaries could make a major contribution to the health of their community. The principal responsibilities of the health post staff could be described as follows:

(1) Maternal Health Care.

Identify expectant women in the community and refer those likely

to have serious complications of pregnancy or delivery.

Provide the basic elements of prenatal, perinatal and post-partum care, either directly, or through trained and supervised indigenous midwives.

Instruct mothers in newborn care.

(2) Environmental Sanitation.

Promote and protect community water supplies.

Reduce other major environmental hazards.

(3) Communicable Disease Control.

Immunize or vaccinate susceptible age groups against those diseases for which such measures are appropriate.

Maintain surveillance of the community so that outbreaks of disease can be reported promptly to higher authority for investigation and control.

(4) Nutrition.

Recognize and refer severe cases of nutritional deficiency.

Instruct mothers in nutrition.

Distribute supplementary foods in accord with governmental policy.

(5) Treatment of Injuries and Illness.

The most controversial of the responsibilities that might be assigned to non-medical personnel is that of treating injuries and illness. Nevertheless, it has proved possible in countries such as Venezuela, Colombia and Chile to so define the scope of practice that conflicts between the medical profession and rural health workers have not developed. Three types of responsibilities can be distinguished:

Treat minor symptomatic illness and injuries

Recognize and refer cases requiring medical treatment after taking appropriate measures to ensure the patient's arrival in a satisfactory condition (e.g., administration of penicillin to persons with a severe infection, splinting a possible fracture).

With auxiliary personnel limited only to these activities and subject to regular supervision, the benefits to the public's health would far exceed the risks.

(6) Statistics.

Collect, tabulate and report certain vital, activity, demographic and morbidity statistics.

(7) Supervision

Provide limited supervision for rural health auxiliaries, to be described.

Instead of the present-day sanitarium, the administration of such a post would require a health worker with at least two or three years of specialized training beyond the completion of secondary school. The best choice would probably be a public health nurse, preferably male, with some specialized training in maternity care, administration, and the treatment of simple medical and traumatic conditions. However, the shortage of nurses makes this an unlikely solution in the foreseeable future.

A much more feasible alternative would be to train a "rural health technician" expressly for this job, building as much of the curriculum as possible around that used in university nursing schools. Then, after a period of service, these individuals could enter nursing schools at a somewhat advanced level in order to obtain a degree. Such a policy would be beneficial in several important ways: it would eliminate the danger now faced with the sanitarium, i.e., that once out of the control of an official health agency, the rural health worker may become a sort

of local curandero; it would also provide hospitals and health centers located in the larger urban centers with an excellent source of professional nursing personnel with previous experience in administration, supervision and rural health work. Indeed, if individuals entering this program were carefully selected and made to feel part of an elite, it might be possible to attract some who could eventually enter medical school and qualify as physicians. Doctors with prior rural and public health experience would represent an extremely valuable national asset.

Another important benefit of personnel retraining and upgrading is that it avoids the problems of a "closed career." One of the principal obstacles to attracting and holding competent persons in rural service is the lack of opportunities for advancement. In country after country those assigned to work in the most peripheral units tend to be forgotten. Supervision is limited, plans for periodic rotation through more urban facilities and for refresher training usually exist only on paper, and the rural health worker is at a disadvantage when he tries to transfer back to the town or city. With little chance to move up in the health system, he either moves out or, as frequently happens, stagnates professionally.

Usually the phenomenon of professional stagnation is associated only with the physician or other high level health worker assigned to work in rural areas. It is probably equally true, however, of the middle-level health worker and to some extent, even of low-level auxiliaries. To maintain perspective, to be challenged to do one's best, to keep oneself abreast of new techniques, all presume an intimate and frequent contact with the regional authority. But even with this contact, prolonged

residence in an isolated rural community, with little prospect of change, is rarely acceptable to the caliber of rural health worker needed. An essential element, then, of any blueprint for a successful program of rural health care is a system of employment that provides for maximum flexibility, both vertical within the organizational hierarchy, and geographically within the country.

The Rural Health Auxiliary. In the proposed scheme, solitary health workers would be initially utilized in communities of 500 to 1000 inhabitants, though eventually in even smaller population centers. To each community would be assigned a rural health auxiliary (RHA) similar to the one used in Venezuela<sup>a</sup> to meet the health needs of dispersed rural populations.

Although the RHA would in some ways be comparable to the present day sanitario, there would also be important differences. Most importantly, the population served would be smaller, training and supervision would be more formalized, and the scope of action would be better defined. As in Venezuela, RHA trainees would preferably be selected from the same communities to which they will later be assigned, most would have only a primary education, and they would be trained for approximately three

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<sup>a</sup>For a good presentation of the arguments in favor of such an auxiliary see, "Estudio de los Problemas Sanitario Asistenciales de la Poblacion Rural Dispersa", by Dr. Jose Ignacio Baldo, et al., presented at the 18th Assembly (Sept. 1963) of the Venezuelan Medical Federation. See also "Instrucciones para la Atencion de la Salud en la Poblacion Rural Dispersa por Personal No Profesional" (prepared by Dr. Emilio Lopez Vidal for the Min. de Sanidad y Asistencia Social, Caracas, 1962) for a description of the specific responsibilities expected of this type of personnel.

months at a medical post or health center within their region. Once assigned to their home communities, RHAs would provide services such as immunizations, elemental maternity and child health supervision, treatment of minor illnesses and injuries, as well as collection of some demographic, vital and epidemiologic data. In the proposed scheme the primary responsibility for supervision would correspond to personnel at the health post, though the auxiliary would periodically return to the health center or medical post for refresher training.

Costs and Prerequisites. The scheme of health services just outlined would require only a small increase in the resource requirements of the health sector. For example, based on the tentative standards outlined below, the net increment in sectoral expenditures would amount to slightly over one percent.

Medical Posts. About 350 units, serving communities of 3000+ urban inhabitants and with a total service area population of 15-20,000; the health staff would average three physicians, 1.5 nurses, 6 auxiliaries, and one midwife, dentist, sanitary inspector, technician and pharmacy aide.

Health Posts. About 700, serving two-thirds of the communities with an urban population of 1000 to 3000. Staff would be gradually increased to a maximum of one director and four auxiliaries.

Rural Health Aides. About 1100, serving 50 percent of the communities with 500 to 1000 urban population.

Regarding manpower, the demand for dentists and midwives would be increased by several hundred, for nurses by about 500, and for auxiliaries, by over 3000; the demand for physicians and technicians would be reduced by about 300 each. In fact, the manpower demand for small communities might have considerably less effect on total demand if compensatory shifts could be accomplished elsewhere such as from the private to public sectors or from large to smaller communities.

For a regionalized system of health care to be successful, adequate supervision must be provided for each level of the institutional hierarchy. In the scheme outlined it would be particularly important to provide frequent supervision of the health post where it is proposed to entrust the day-to-day administration of the post to subprofessional personnel. The standards suggested for the type of facility to be provided in each size of community take this factor into consideration, providing a ratio of about two health posts per medical post. In addition, each medical post would control between three and four rural health auxiliaries through the intermediate level of the health post. With these ratios it would be possible for each medical post physician to have no more than one health post under his charge, thus allowing a weekly visit, with perhaps a second visit being made by one of the other medical post professionals. Although eventually it might be possible for each medical post to supervise a larger number of health posts and RHAs, this should not be attempted until adequate transportation is available.

Evidently, before a scheme of rural health care of the type proposed could be adopted, much more study would be necessary to set standards, determine costs, and verify its presumed advantages over existing practices. Indeed, the lack of experience in Peru with a health facility operated by specialized auxiliary personnel would make it difficult to establish as many as 700 such posts by 1984. Similarly, it would probably not be desirable to eliminate all medical posts operated by a single physician, nor would the demand in many communities justify three physicians for some years to come. What is needed at this juncture is not so much a new rural health policy but rather a concerted evaluation of the present one.

#### Improving Manpower Distribution

Three different policies have been used by countries attempting to improve the urban-rural balance of health professionals: (1) a rapid increase in supply, (2) compulsory rural service, and (3) inducements for rural service.

The effect of a rapidly increasing physician supply on the distribution of Peruvian physicians was noted in Chapter 2. As Lima became overcrowded, more than half of the 1400 doctors added between 1957 and 1964 located in the provinces and the percentage of the total supply in the capital declined from 72 to 65 percent.

With the private sector of most urban centers now saturated with physicians, further increments in supply would likely have little effect

on distribution. More probable would be an increase in emigration and for those who remain, even lower productivity. The situation confronting Trujillo is instructive. Between 1964, when the Trujillo medical school produced its first graduating class, and 1966, the number of physicians in the city increased by more than 50 percent to attain a physician-population ratio of approximately 1:500. Most of the increment is made up of recent graduates who prefer being unemployed in the city to living in a small town.

Some form of compulsory rural service, usually for physicians only, has been adopted by a number of countries but the results have not been entirely satisfactory. Once the required law is passed government officials tend to consider the "rural problem" solved, forgetting that it is not where the physician is but what he does that matters. By allowing the doctor's presence to substitute for an adequately staffed and equipped rural health program, funds are wasted and opposition generated to rural service in particular, and government employment in general. Those problems can be avoided but the risks of this policy must be carefully balanced against the benefits.

Where feasible, a voluntary system based on incentives and careful educational programming offers the best alternative. The results of a five-year study on the rural internship in India<sup>45</sup> are of help in assessing which measures may have the greatest effect in attracting physicians to rural service. Those with greatest applicability to Peru are outlined below:

- (1) **Interns coming from a rural background, or from lower socioeconomic groups, or with a greater appreciation of community service and a higher social concern were more interested in rural service than those without these characteristics.**
- (2) **Deficiencies in professional working conditions was the most important factor deterring interns from rural service. Among the unfavorable factors affecting personal living, isolation from educational and urban facilities were more important than salary levels or housing.**
- (3) **Although interns were often attracted by the challenge of independent responsibility in a rural setting, this was frequently counteracted by a lack of confidence in their professional ability. A carefully supervised rural internship tended to improve their confidence and ability to deal with rural problems.**
- (4) **Because of the uniformly high respect for clinical teachers, the involvement of clinicians in rural activities will likely have a major impact on the attitudes and preparation of physicians for rural service.**

**By adopting the measures that logically flow from these observations, service in small communities would undoubtedly attract a greater proportion of medical graduates in the future.**

**It is unlikely, however, that modified student selection and training will be sufficient, nor will the results of such changes be immediately evident. It will also require some years before living and working conditions in small towns are sufficiently favorable to induce many physi-**

cians to work there. More direct measures are necessary to redistribute professional personnel.

The policy recently adopted by Chile's National Health Service of making Santiago positions available only to those physicians with five or more years experience in the provinces might well be adapted to meet Peruvian needs. Since the N.H.S. is the principal employer of medical personnel and few young physicians can support themselves on private practice alone, the effect on distribution has been notable. If a similar policy were adopted in Peru it should be applied to all public sector institutions and not just the Ministry of Health. Other incentives, already under consideration in Peru, could include higher salaries, more rapid advancement, and preference in obtaining study fellowships for those who work in certain designated areas. To ensure that sufficient priority is given to needs of smaller communities, the Ministry of Health might also establish a formula whereby preference was given to small communities in the allocation of the new positions created each year.

The biggest problem in effecting a redistribution of professional personnel is not in devising the necessary inducements but in implementing them. Even the cost of implementation should not represent an insuperable obstacle since at most the added inducements would apply to only about 20 percent of Peru's public sector personnel and would increase public expenditures by no more than 10 percent. What most endangers a policy of redistribution is a failure to achieve broad support from all interested groups. With most health workers committed to urban living, ways are soon found to either take away the benefits promised to those in rural service or to use them as a lever to escalate salaries. Accordingly, the

Ministry of Health should seek the collaboration of professional associations, universities and other service agencies before embarking on a major program of personnel redistribution.

#### Manpower Planning: Organization and Research

Prior to the early 1960's, health manpower planning in Peru would have been very difficult, if not impossible. Responsibility for making policy was diffuse and political considerations were often dominant. Moreover, there was little administrative stability, statistics were generally unavailable or unreliable, and institutional rivalries would have impeded implementation.

Many problems still exist but changes have taken place in the last several years to make them easier to solve in the future. The most notable change has been in the acceptance of planning as a means of promoting development, not only in the health sector but throughout the economy. In health, perhaps the most remarkable effect of the planning effort has been on the generation of statistical data. Lacking a broad perspective on Peru's needs and resources in the past, most agencies and training institutions were understandably concerned with only their own individual problems.

A second and still incipient change, concerns the role of the professions in manpower policy. In past years the professional associations were dedicated almost entirely to promoting the economic and political interests of their membership. Now, starting with the Dental College created by law in 1964, new bodies are being organized to assume broader,

more technical responsibilities.<sup>a</sup>

The way in which the traditional professional associations, or more aptly, "unions", will relate to the quasi-legal colleges remains to be seen. Ideally, the two types of organizations should remain separate, though in practice this is unlikely to occur. Most probably the associations will gradually disappear as their functions become progressively absorbed by the colleges. The combination of technical and political functions in the same organization need not, however, result in sacrificing the former to the latter. If the official agencies concerned with manpower planning are skillful in getting the colleges to collaborate in the planning process, powerful support can be thereby enlisted to facilitate plan implementation. Ways in which this might be done are discussed below.

A third change is reflected by the growing involvement of public agencies in both professional and auxiliary training. The potential benefits of this trend are evident; educational budgets can be increased and training more closely related to service requirements.

This change also introduces the risk that short-term government needs may dictate and distort educational policies -- for example, by leading to an excessive expansion of training programs for certain types of personnel or by promoting ill-considered curriculum changes. To avoid these risks, investment policies should be closely coordinated with overall health and educational policies so that the manpower demand resulting from new facility construction does not exceed the expansion in supply.

The rapid proliferation of professional schools has brought in its wake a change of attitude among educators with important implications for

<sup>a</sup>In the Dental College these include: regulating the practice of dentistry, promoting postgraduate education, providing standards of conduct, and advising the government on matters concerning the profession.

planning. Starting with 21 professional schools in 1960, by 1966 there were 36 and 6 more were under consideration. With each new school making further demands on scarce resources and introducing new variants in the curriculum, the drive to improve educational quality has become increasingly difficult. As a result, educators are now beginning to look for ways to coordinate future educational policy.

Although mechanisms for coordination exist for medicine and nursing, specific accomplishments have so far been meager. If the inter-school associations are to have an important policy role, they must first:

- (1) Establish a continuing source of data on which to base decisions.
- (2) Employ a permanent staff to develop and implement association policy. In 1966 the Association of Peruvian Medical Faculties

employed one physician two hours a day and the Permanent Committee (nursing) had no one. Unless member schools are willing to collectively contribute a minimum of three or four full-time professional staff to work on the broad problems affecting future institutional development, progress is certain to be slow.

- (3) Plan for political action. Congressional committees exist to review legislation affecting health and education but as of 1966 neither inter-school association had a systematic way of identifying those bills of potential importance, nor were they in a position to testify as to their merits. In a country where politics has often had a pervasive influence on the health sector, the reluctance of educators to enter the national political arena is understandable, though it is here where the important decisions

are often made. Good health is a high priority and neither the Congress nor the executive branch can afford to ignore well documented proposals to improve the nation's health manpower resources.

- (4) Directly involve member institutions in the search for improved ways of meeting national manpower needs. Resources should be committed to planned educational experimentation and arrangements made for the frequent interchange of information and faculty. The staff of each inter-school association can act as the catalyst for such projects but the schools themselves will have to bear the burden of their execution.

Planning Organization: A Proposal

The number of groups interested, or potentially interested in manpower problems is impressive, as the below listing shows.

Training Institutions (professional and technical)

Faculties of Medicine, Dentistry, Pharmacy and Sanitary  
Engineering

Schools of Nursing, Midwifery, Social Work, Public Health and  
Technicians

Inter-school associations (medicine and nursing)

Service Institutions

Ministries of Health, War, Air, Navy, Government and Education

Social Insurance Funds

Charity institutions

Private hospitals and clinics

Local municipalities

Professional Associations

Associations of physicians, dentists, pharmacists, nurses,  
midwives, social workers and others

Legally-constituted professional "colleges" (dentistry and  
pharmacy)

Policy-Making and Coordinating Bodies (with representation of the  
consumer public)

Inter-University Council (for universities)

National Education Council (for the Ministry of Education)

National Health Council (for the Ministry of Health)

National Development Council (for investments)

Planning Bodies

Health Sector Planning Office (dependent on the Ministry of  
Health; for the entire sector)

Programming Offices (administratively dependent on each public  
agency concerned with health; technically dependent on the  
Health Sector Planning Office)

Programming Office for Education & Human Resources (dependent  
on the National Planning Institute; for general manpower)

Education Sector Planning Office (dependent on the Ministry of  
Education; for primary, secondary and technical education)

University Sector Planning Office (dependent on the Inter-  
University Council; for higher education)

For these diverse groups to bear effectively on manpower problems, there  
must be a way of providing a central focus to their efforts. One alter-  
native, adopted by some developing countries, has been to create  
a high-level health manpower board with representation from each of the

Major interest groups. Such a board could readily be constituted in Peru as a subsidiary to an existing body such as the National Health Council or Inter-University Council. Staff work for the manpower board could either be performed by a special secretariat or, preferably, by the Health Sector Planning Office.

This possibility was discussed with a number of health leaders and ultimately rejected. Although conceptually sound, most Peruvians interviewed on the matter believed that experience had amply demonstrated how difficult it is to make a high-level body with such a divergent constituency effective.

Alternatively, the idea emerged of using the Health Sector Planning Office as the prime coordinating body for matters related to health manpower. In the absence of executive authority, discretionary funds or a large staff, this role will prove a challenging one; it does not, however, appear unworkable. Outlined below is a suggested model of how the Planning Office might discharge this function and of the responsibilities that could be assumed by the various groups interested in health manpower.

**RESPONSIBILITIES ASSUMED BY**

| <b>Educational Institutions and/or Inter-School Associations</b>  | <b>Health Sector Planning Office</b>   |
|---|--|
| Annually provide data on graduates, degree validations, applicants, enrollment and other information necessary to project future graduates. | Make and transmit manpower supply and demand projections; interpret special manpower needs and problems of the service agencies. |
| Develop (and enforce, if practicable) educational standards for member institutions.  |  |

**Collaborate in the preparation of manpower training and utilization standards**

**Represent the interests of the educational institutions before the executive and legislative branches of government.**

**Promote and conduct research on (1) the effectiveness of alternative teaching methodologies and (2) the educational requirements of professional practice.**

**Promote and collaborate in the preparation of such standards.**

**Promote and, if indicated, collaborate in research projects of the second type; facilitate collaborative research between educational institutions and service agencies.**

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**Professional Associations and "Colleges"**

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**Health Sector Planning Office**

**Maintain current registry of personnel, if able to do so. Analyze supply characteristics.**

**Provide technical and arrange for financial assistance for maintenance of professional registry; maintain registry if this function can't be assumed by association and analyze supply characteristics; make supply projections.**

**Do applied research on matters affecting distribution, retention, and utilization of professional personnel.**

**Promote and, if indicated, collaborate in research projects.**

**Represent interests of profession on matters affecting it.**

**Regulate professional practice and enforce standards of conduct; promote continuing education.**

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**Service Agencies**

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**Health Sector Planning Office**

**Provide data on activities, expenditures, number of employees and vacancies for selected personnel categories, and for doctors and dentists, number of hours worked.**

**Process data and make it available to sector; develop sectoral demand projections; identify manpower imbalances likely to develop.**

Identify major problems related to manpower training and utilization.

Provide data on personnel training programs (types, levels, enrollment, output, projected output, etc.)

Provide facilities and health jurisdictions to be used as practice areas for students of the health professions.

Develop staffing, productivity and utilization standards.

Conduct applied research on problems such as staffing, productivity, effectiveness, facility utilization and demand.

Assist as necessary in bringing these problems to the attention of educational institutions.

Aggregate training data for sector and make supply and demand projections; facilitate exchange of information and promote modifications in programs to better meet needs.

Where indicated, transmit and interpret needs of educational institutions for appropriate practice areas.

Promote and collaborate in the preparation of such standards.

Promote and, if indicated, collaborate in research of this type.

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**Other Planning and  
Coordinating Bodies**

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**Health Sector Planning Office**

Provide national guidelines for education and health sector investments, for share of manpower pool available for health, and for development priorities.

Provide national manpower data and projections.

Plan and oversee development of education sector.

Incorporate these guidelines in sectoral plans and interpret them to agencies in the sector; interpret sectoral plans and problems to agencies outside of sector.

Provide sectoral manpower data and projections.

Plan and oversee development of the health sector.

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Several principals evident in the proposed scheme deserve to be made explicit. The first involves decentralizing as much as possible the responsibilities of data collection and preliminary analysis. Too often this is the task of a central statistical agency in which the relationship between it and the respondent institutions is only one-way. Even at the initial sacrifice of some statistical accuracy, the Planning Office should contract with the professional associations or colleges for the maintenance of professional manpower registries, as is now done in the United States. This policy would have two advantages: it would ease the work load of the Division of Health Statistics and, by having the associations participate in the data collection process, they would be more liable to accept the conclusions derived from them. Similar arrangements could be made with the educational institutions (or inter-school associations) for the collection and processing of data necessary to project the future output of graduates.

The lack of adequate staff or of previous statistical experience in the various associations will make it necessary for the Planning Office to proceed slowly in applying this principle. During the initial phase of each arrangement, statistical personnel from the Ministry may have to spend a considerable amount of time in setting up the registry and verifying that the defined standards of statistical accuracy are adhered to. Moreover, the associations cannot be expected to assume this function unless they are compensated for their investment.

A second principle is the clear delineation of responsibilities among the various institutions participating in the planning process. It is especially important that there be no overlap between the health and

education planning office. Conceptually, the manpower questions each should be concerned with can be separated into (1) "What are the nation's health manpower requirements?" and (2) "How may these requirements best be met?" The first question is inescapably the responsibility of the Health Sector Planning Office, although projections will, of course, be modified by the education sector's capacity to produce the desired manpower. The second question, of how to best allocate resources within the education sector to attain the desired manpower targets, should be the responsibility of the planning and programming offices within that sector.

Peru has so far given very little importance to the need for operations research into manpower problems. As in the case of data collection, the benefits to be gained from collaborative agreements between the Planning Office and other institutions for the conduct of such research go well beyond the results alone. To cite one example, it would be extremely important to better document why such a large proportion of dentists leave active practice. If the Planning Office arranged to investigate this question with its own or Ministry resources, the results -- and the conclusions derived therefrom -- might well be unacceptable to the dental schools and professional organizations. Although a study project carried out jointly among the various groups interested in dental manpower might be somewhat more difficult to execute, the probability that the findings would influence policy would be much greater. The research experience itself would also help to strengthen the participating organizations and promote mutual understanding.

In summary, the proposed scheme can be described as a loosely knit matrix of institutions and organizations interested in manpower problems

**that are coordinated and oriented, but not directed, by the planning offices in the health and education sectors. Overall guidelines would originate from the Health Sector Planning Office. To the extent possible, responsibilities for component parts of the planning process would be decentralized to the appropriate institutions by means of agreements for doing applied research, for collecting statistics, and for maintaining registries. Decision-making would generally be decentralized to the level of the institutions affected, it being hoped that plan logic will usually suffice to orient policies. Major policy decisions, or ones involving institutional conflict, could be submitted to the Inter-University Council or the National Health Council, though at the present time neither of these bodies has a constituent membership well-suited to the consideration of health manpower problems. As additional experience is acquired in planning, the possibility of forming a health manpower board to coordinate and make manpower policy should be considered. If this is done, the responsibilities of secretariat to the board could be shared by the planning offices of the health and education sectors.**

**Needed Research**

**In order to continually refine his understanding of the alternative policies open to him, the planner must often depend on the results of applied research. This section identifies the research problems currently of highest priority in Peru, not only because of their relevance to manpower planning, but indeed to the total planning of the health sector.**

**Standards. Irrespective of how derived, the manpower planner requires standards. Even if the demand projection is based only on the maintenance of a certain population-manpower ratio, this ratio becomes the standard by**

which targets are set and against which progress is measured. Where other, more complex methods of projection are used in which the objectives are to improve not only the quantitative supply of health manpower but also its structure and composition, the importance of standards becomes even greater.

Without exception, the standards used in the Peru study are based on empirical judgment. In some situations, as in the case of projecting requirements for teachers at professional schools, there is at least some objective basis to suggest that the standards are reasonable. In others, judgment is the sole criterion. While judgment is a sound basis on which to start, measures should be taken to ensure that subsequent revisions benefit from experience. High priority should be assigned to research projects designed to demonstrate the interactions between different ways of staffing a facility, operating costs, the output of services, and, ultimately, effectiveness.

To be scientifically rigorous, such studies could become very costly in money, and of more importance in scarce high level personnel. But to merely improve on the past, scientific rigor is not necessary. By using different staff ratios at a few otherwise similar facilities and systematically observing the results over time, important clues can be gained as to how best improve health care. Building on a modest research program of this nature, within a few years health officials would be in a much better position to estimate their long-range resource requirements than is now the case.

Training and Function. The Peru study raised many questions concerning the relation between training and function. What are midwives (pharmacists,

doctors, etc.) being taught to do? What are they doing and are these activities appropriate? These questions are as difficult to answer as they are important to ask. If imaginative ways can be sought to design projects suitable to answer some of these questions, the findings could provide educator and administrator alike with a far better basis on which to plan.

**Losses of Health Manpower.** The chapters on supply gave evidence that many health professionals are not using their training but unfortunately these conclusions could not be unequivocally documented. Since policy decisions would differ radically depending on whether a surplus of a given type of health worker exists or not, it is important to confirm these findings, and where possible, determine the reasons for high rates of attrition. In carrying out such studies it would be desirable to involve social scientists at San Marcos and other universities as well as the professional associations and other interested groups.

**Public and Private Sector Growth.** A major limitation of the study was the lack of a reliable basis for estimating the rate at which the health sector can expand. Linking the costs of alternative hypotheses of sectoral growth to the projected gross national product does help to avoid grossly unrealistic targets but should be replaced with a better methodology as soon as feasible.

Looking first at the private sector, is it justified to assume that the demand for private health care bears some relatively constant relationship with the urban population? Using the results of the health manpower census as a base-line, it should not be difficult within several years to locate a second "point" on a graph so that a growth line for the

private sector can be drawn. Two types of information would be necessary: a new estimate of the full-time equivalent professionals working in private practice (obtained from updating the inventory of health manpower on a sample basis), and appropriate population estimates for the nation and for urban areas. If a third estimate of the F.T.E. private practitioners were obtained by the time of the next census of the national population (presumably in the early 1970's), subsequent projections of private sector growth could be based, in part, on an extrapolation of previous experience.

Additional information could be gathered by asking a sample of professionals surveyed in relation to the manpower inventory about the attractiveness of private practice in their community. By using questions such as, "Have private clientele become more (or less) numerous in your community", "What percent of your time is spent with private patients, and has this proportion changed in recent years", and "Would you take a full-time government job if it were available", important information could be obtained on the dynamics of the private sector.

Paradoxically, projecting the rate of public sector growth may be even more difficult than for the private sector because the decision-making process is less diffuse. Several issues merit priority investigation. One, already stressed in previous sections, is the need to accurately measure the current demand made by insured groups of defined characteristics, to estimate what the demand would be in groups not currently eligible for benefits, and to determine how fast demand will grow with the introduction of a new service or facility. As this information is systematically collected the government will be better able to anticipate the rate

at which new commitments to provide health care should be undertaken.

Another important factor in the equation for projecting public sector growth is the amount of money potentially available from both public and private sources to support governmental health care. Experimentation with various methods of shifting some of the fiscal burden from taxes to the users of public facilities while at the same time discouraging health expenditures judged of low efficacy, could allow the sector to develop considerably faster than would otherwise be possible.

Lacking adequate criteria to project separately the manpower requirements of each public sector health agency, all agencies had to be treated as a unit. As these agencies progressively commit themselves to the need to plan and to rationalize the way resources are used, it may become possible to partially disaggregate their separate manpower requirements and thereby refine projections.

Rural Peru. Irrespective of the method or methods used to meet the health needs of rural Peru, progress will be slow. The barriers to change are strong and the resources available to overcome them scarce. But to recognize that no easy solution exists is not to depreciate the importance of careful research in this area. Within the dominant pattern of providing health care to rural populations, provision should be made for experimenting with alternative ways of meeting needs. Investigation should attempt to determine the "outreach" of the programs, the quality of services provided, their presumed effect, and the ability of different approaches to mobilize community resources to meet local needs. Answers to these questions, even though partial, could greatly assist health workers to improve the health of rural populations.

Conclusion.

The Preface cautioned against planning manpower over too short a period. It is fitting that in concluding this monograph, mention be made of several related problems that may arise as a result of the long planning period used for manpower.

The first is the failure to implement on schedule those policies necessary to the attainment of the desired objectives. How can administrators or educators be concerned about problems one or two decades hence when they are beset by a dozen at the moment? Perhaps if the target were 1968 or 1970 they would feel a sense of urgency about implementation. But 1984! Let that year be the next generation's worry.

This attitude neglects the fact that the "payoff" of even a long-range plan is its effect over short-range policies. To get to tomorrow's goal actions must be taken today. By setting the "tomorrow" reasonably far off in the future, the points where action should be taken can be more readily determined. This study has considered several alternative manpower policies open to Peru -- an effort which alone does nothing to ensure an improved supply of manpower in the future. The task of selecting the desired policy, and of translating it into a series of implementing steps, must await the deliberation of Peruvian health authorities.

Second, selection of a distant target tends to weaken the credibility of planning itself. The question is asked whether the needs of a dynamic and changing society can, in fact, be predicted over a twenty-year period.

One who adopts this point of view has misunderstood the cardinal objective of any long-range manpower plan -- to set in motion changes now

which will make it more likely that future objectives can be attained.

No one now knows or can know the precise numbers, types and mixes of health manpower that will be most appropriate in 1984. The real test of the usefulness of this type of study is not whether the actual requirements in the target year were correctly anticipated. Rather, the relevant question was whether the study, and resulting plan, correctly indicated the general direction in which human resource development should go during the next three or so years.

From the above flows the final observation. Plan evaluation and revision cannot wait until 1984. Manpower planning, as with any other type of planning, must be a continuing process in which needs are constantly reassessed in the light of changing circumstances. And in this reassessment, the lessons of the past, favorable and unfavorable, are invaluable as guides to future decisions. Three years from now is not too early to test the validity of the major findings and conclusions of this initial effort at national health manpower planning in Peru; five years would be too late.

Appendix A. ESTIMATED MID-YEAR POPULATION (in 1000's):  
Peru, 1925-1984<sup>a</sup>

| YEAR | POPULATION | YEAR | POPULATION |
|------|------------|------|------------|
| 1925 | 5,229      | 1955 | 8,790      |
| 1926 | 5,309      | 1956 | 9,004      |
| 1927 | 5,391      | 1957 | 9,235      |
| 1928 | 5,475      | 1958 | 9,483      |
| 1929 | 5,562      | 1959 | 9,746      |
| 1930 | 6,651      | 1960 | 10,025     |
| 1931 | 5,743      | 1961 | 10,320     |
| 1932 | 5,837      | 1962 | 10,632     |
| 1933 | 5,933      | 1963 | 10,958     |
| 1934 | 6,032      | 1964 | 11,298     |
| 1935 | 6,134      | 1965 | 11,650     |
| 1936 | 6,238      | 1966 | 12,012     |
| 1937 | 6,345      | 1967 | 12,385     |
| 1938 | 6,455      | 1968 | 12,772     |
| 1939 | 6,566      | 1969 | 13,172     |
| 1940 | 6,681      | 1970 | 13,586     |
| 1941 | 6,797      | 1971 | 14,015     |
| 1942 | 6,915      | 1972 | 14,456     |
| 1943 | 7,035      | 1973 | 14,912     |
| 1944 | 7,159      | 1974 | 15,383     |
| 1945 | 7,285      | 1975 | 15,869     |
| 1946 | 7,415      | 1976 | 16,371     |
| 1947 | 7,547      | 1977 | 16,889     |
| 1948 | 7,682      | 1978 | 17,422     |
| 1949 | 7,822      | 1979 | 17,968     |
| 1950 | 7,969      | 1980 | 18,527     |
| 1951 | 8,118      | 1981 | 19,101     |
| 1952 | 8,267      | 1982 | 19,693     |
| 1953 | 8,425      | 1983 | 20,304     |
| 1954 | 8,597      | 1984 | 20,933     |

<sup>a</sup>Peru, Inst. Nac. de Planif., Dir. Nac. de Estadística y Censos. Boletín de Análisis Demográfico, Año I, No. 1 (Nov. 1964) Table 1, p. 57. Jungle Indian population omitted. This source gives estimates only for 1920-80, inclusive; estimates for the period 1981-84 are based on an assumed annual growth rate of 3.1 percent.

Appendix B. DISTRICTS INCLUDED WITHIN EACH POPULATION GROUP<sup>a</sup>

POPULATION GROUP

Metropolitan Lima (20 districts)

|                     |                   |                      |
|---------------------|-------------------|----------------------|
| Ate                 | La Victoria       | San Isidro           |
| Bellavista (Callao) | Lima              | San Jose de Surco    |
| Brena               | Lince             | San Martin de Porres |
| Callao              | Magdalena del Mar | San Miguel           |
| Carabayllo          | Magdalena Vieja   | Santiago de Surco    |
| Chorrillos          | Miraflores        | Surquillo            |
| La Punta            | Rimac             |                      |

50,000-249,999 (15 districts)

|                    |                    |             |
|--------------------|--------------------|-------------|
| Arequipa           | Chiclayo           | Piura       |
| Bellavista (Areq.) | Chimbote           | Sullana     |
| Castilla           | Cuzco              | Trujillo    |
| Cayma              | Iquitos            | Yanahuara   |
| Cerro Colorado     | Miraflores (Areq.) | 24 de Junio |

25,000-49,999 (6 districts)

|          |            |         |
|----------|------------|---------|
| Callaria | Ica        | Parinas |
| Huancayo | Lurigancho | Tacna   |

10,000-24,999 (33 districts)

|                |              |            |
|----------------|--------------|------------|
| Ayacucho       | Huancavelica | Nazca      |
| Barranca       | Huanuco      | Pacasmayo  |
| Cajamarca      | Huaral       | Pativilca  |
| Catacaos       | Huaraz       | Pisco      |
| Cerro de Pasco | Jauja        | Puno       |
| Chepen         | Juliaca      | Sana       |
| Chincha        | La Brea      | Sicuani    |
| Chocope        | La Oroya     | Tarapoto   |
| Chulucanas     | Lambayeque   | Tarma      |
| Ferrenafe      | Mollendo     | Tumbes     |
| Huacho         | Monsefu      | Yurimaguas |

Under 10,000 (remaining 1546 districts)

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<sup>a</sup>Classification is according to the urban population found in each district in the 1961 population census. Districts forming part of a single urban complex such as Arequipa or Lima are grouped according to the total urban population and not just the urban population within each individual district.

Appendix C. INFORMATION OBTAINED IN THE CENSUS OF PROFESSIONAL AND  
NON-PROFESSIONAL HEALTH PERSONNEL (Shortened Forms)

Professional Personnel

Identification Data

Name  
Sex  
Nationality  
Basic profession  
Year of birth

Professional Studies

School or faculty of graduation  
Location  
Year degree was obtained  
\*Public health studies  
Type, degree, year obtained

Salaried Positions Held (including service, teaching & other)

Employing agency (Ministry of Health; social insurance fund, etc.)  
Type of institution (hospital, health center, pharmacy, etc.)  
\*Position title  
Location (district & province)  
Hours worked per week in each job

Private Practice

Do you attend private patients?  
If yes,  
Hours per week of practice  
Type of "work center" (private office, pharmacy, etc.)  
Address

Present Activity Status

Professional activity status (active, temporarily retired, permanently  
retired)  
If active, what specialty

---

Non-Professional Personnel

Identifying Data

Name  
Sex  
Year of birth  
Last year of completed  
education

Job Data

Present job classification  
Employing agency  
Type of institution  
Location  
Pre-service training (weeks)  
\*On-the-job training (weeks)

\*Did not enter into the final data analysis.

Appendix D: NUMBER OF DOCTORS, DENTISTS, PHARMACISTS, NURSES AND MIDWIVES LICENSED: by Year: Peru, 1914-63

| YEAR                  | DOCTORS    | DEN-<br>TISTS | PHARMA-<br>CISTS | NURSES     | MIDWIVES   | YEAR                  | DOCTORS     | DEN-<br>TISTS | PHARMA-<br>CISTS | NURSES      | MIDWIVES    |
|-----------------------|------------|---------------|------------------|------------|------------|-----------------------|-------------|---------------|------------------|-------------|-------------|
| 1914                  | 34         | 14            | 27               | 0          | 10         | 1939                  | 41          | 11            | 27               | 40          | 18          |
| 1915                  | 24         | 20            | 20               | 0          | 10         | 1940                  | 82          | 11            | 41               | 52          | 16          |
| 1916                  | 25         | 29            | 21               | 0          | 6          | 1941                  | 66          | 27            | 51               | 65          | 6           |
| 1917                  | 19         | 16            | 20               | 7          | 1          | 1942                  | 70          | 20            | 42               | 75          | 17          |
| 1918                  | 24         | 32            | 30               | 5          | 7          | 1943                  | 82          | 29            | 52               | 80          | 36          |
| 1919                  | 24         | 24            | 19               | 3          | 5          | 1944                  | 72          | 25            | 50               | 126         | 40          |
| 1920                  | 14         | 30            | 6                | 5          | 6          | 1945                  | 87          | 56            | 61               | 108         | 38          |
| 1921                  | 6          | 26            | 9                | 7          | 0          | 1946                  | 121         | 30            | 44               | 164         | 27          |
| 1922                  | 15         | 19            | 17               | 8          | 5          | 1947                  | 143         | 37            | 67               | 120         | 48          |
| 1923                  | 8          | 14            | 22               | 5          | 2          | 1948                  | 134         | 56            | 75               | 109         | 48          |
| 1924                  | 40         | 7             | 14               | 9          | 1          | 1949                  | 142         | 56            | 51               | 141         | 80          |
| 1925                  | 52         | 8             | 8                | 19         | 10         | 1950                  | 160         | 87            | 67               | 126         | 81          |
| 1926                  | 54         | 6             | 20               | 4          | 14         | 1951                  | 132         | 65            | 74               | 154         | 101         |
| 1927                  | 42         | 11            | 21               | 20         | 14         | 1952                  | 186         | 54            | 60               | 151         | 98          |
| 1928                  | 69         | 10            | 5                | 26         | 22         | 1953                  | 258         | 102           | 88               | 157         | 140         |
| 1929                  | 49         | 12            | 11               | 15         | 33         | 1954                  | 283         | 121           | 138              | 197         | 88          |
| 1930                  | 62         | 17            | 10               | 25         | 15         | 1955                  | 376         | 116           | 109              | 189         | 51          |
| 1931                  | 48         | 6             | 5                | 23         | 40         | 1956                  | 477         | 98            | 154              | 172         | 54          |
| 1932                  | 25         | 0             | 8                | 32         | 36         | 1957                  | 435         | 70            | 129              | 193         | 49          |
| 1933                  | 0          | 2             | 0                | 37         | 0          | 1958                  | 415         | 59            | 130              | 223         | 97          |
| 1934                  | 30         | 2             | 5                | 70         | 7          | 1959                  | 180         | 141           | 140              | 234         | 32          |
| 1935                  | 64         | 6             | 9                | 58         | 22         | 1960                  | 216         | 154           | 142              | 300         | 79          |
| 1936                  | 53         | 10            | 8                | 37         | 31         | 1961                  | 210         | 184           | 159              | 280         | 75          |
| 1937                  | 43         | 15            | 17               | 45         | 14         | 1962                  | 312         | 151           | 187              | 292         | 78          |
| 1938                  | 63         | 8             | 17               | 34         | 28         | 1963                  | 420         | 259           | 188              | 302         | 64          |
| <b>Sub-<br/>total</b> | <b>887</b> | <b>344</b>    | <b>349</b>       | <b>494</b> | <b>339</b> | <b>Sub-<br/>total</b> | <b>5100</b> | <b>2019</b>   | <b>2326</b>      | <b>4050</b> | <b>1461</b> |

Appendix E. PROFESSIONALLY ACTIVE DOCTORS, DENTISTS, PHARMACISTS, NURSES AND MIDWIVES; PERSONS PER PROFESSIONAL: by Department: Peru, 1964

| DEPARTMENT    | NUMBER OF PROFESSIONALS |       |                     |       |         | PERSONS PER PROFESSIONAL |       |                     |        |         |
|---------------|-------------------------|-------|---------------------|-------|---------|--------------------------|-------|---------------------|--------|---------|
|               | Doctor                  | Dent. | Pharm. <sup>a</sup> | Nurse | Midwife | Doctor                   | Dent. | Pharm. <sup>a</sup> | Nurse  | Midwife |
| ALL           | 5235                    | 1685  | 1416                | 3103  | 885     | 2200                     | 6700  | 8000                | 3600   | 12800   |
| Amazonas      | 21                      | 15    | 3                   | 6     | 2       | 6500                     | 9100  | 45700               | 22800  | 68500   |
| Ancash        | 92                      | 44    | 40                  | 18    | 27      | 7000                     | 14700 | 16200               | 36000  | 24000   |
| Apurimac      | 13                      | 10    | 2                   | 9     | 4       | 23700                    | 30800 | 154000              | 34200  | 77000   |
| Arequipa      | 253                     | 79    | 75                  | 163   | 42      | 1700                     | 5500  | 5800                | 2700   | 10400   |
| Ayacucho      | 29                      | 13    | 15                  | 17    | 6       | 15200                    | 34000 | 29500               | 26000  | 73700   |
| Cajamarca     | 49                      | 22    | 31                  | 16    | 8       | 17200                    | 38400 | 27300               | 52800  | 105600  |
| Callao        | 298                     | 52    | 55                  | 200   | 41      | 900                      | 4900  | 4700                | 1300   | 6300    |
| Cuzco         | 93                      | 48    | 24                  | 29    | 11      | 7200                     | 14000 | 28000               | 23200  | 61000   |
| Huancavelica  | 12                      | 10    | 4                   | 2     | 5       | 27600                    | 33100 | 82800               | 166000 | 66200   |
| Huanuco       | 37                      | 13    | 16                  | 12    | 6       | 9900                     | 28300 | 23000               | 30700  | 61300   |
| Ica           | 135                     | 42    | 40                  | 63    | 44      | 2200                     | 7100  | 7400                | 4700   | 6800    |
| Junin         | 134                     | 65    | 55                  | 113   | 34      | 4400                     | 9100  | 10700               | 5200   | 17400   |
| La Libertad   | 209                     | 59    | 79                  | 111   | 27      | 3200                     | 11200 | 8300                | 5900   | 24400   |
| Lambayeque    | 134                     | 40    | 41                  | 40    | 9       | 3000                     | 9900  | 9700                | 9900   | 44000   |
| Lima          | 3268                    | 972   | 805                 | 2042  | 551     | 700                      | 2500  | 3000                | 1200   | 4400    |
| Loreto        | 91                      | 51    | 24                  | 32    | 8       | 4400                     | 7800  | 16500               | 12400  | 49500   |
| Madre de Dios | 4                       | 2     | 0                   | 3     | 2       | 4500                     | 9000  | -                   | 6000   | 9000    |
| Moquegua      | 22                      | 8     | 4                   | 22    | 4       | 2600                     | 7300  | 14500               | 2600   | 14500   |
| Pasco         | 45                      | 9     | 6                   | 28    | 11      | 3500                     | 17400 | 26200               | 5600   | 14300   |
| Piura         | 66                      | 68    | 62                  | 85    | 25      | 4600                     | 11300 | 12400               | 9000   | 30600   |
| Puno          | 48                      | 20    | 16                  | 31    | 9       | 15600                    | 37600 | 46900               | 24200  | 83400   |
| San Martin    | 26                      | 18    | 4                   | 7     | 0       | 7200                     | 10300 | 46500               | 26600  | -       |
| Tacna         | 29                      | 11    | 7                   | 45    | 5       | 2700                     | 7000  | 11000               | 1700   | 15400   |
| Tumbes        | 27                      | 14    | 8                   | 9     | 4       | 2400                     | 4700  | 8300                | 7300   | 16500   |

<sup>a</sup>Uncorrected for estimated omission of 304 pharmacists, most of whom presumably worked in the departments of Lima, Callao, Arequipa and La Libertad.

Appendix F, PHYSICIAN INCOME ESTIMATES

Private Practice

The assumptions used to estimate private-practice income were: hours worked per week, patients seen per hour, fee charged per patient, and weeks worked per year. A correction factor for income derived from services rendered to hospitalized patients was then added to the estimated income from ambulatory patient care.

A variety of methods were used to develop the necessary assumptions. Table 1 presents the results of a meeting held with 12 drug detailmen responsible for visiting physicians in the metropolitan Lima area for one of the leading Peruvian pharmaceutical companies.

Table 1. ESTIMATES OF PATIENT VISITS PER HOUR, FEE PER CONSULTATION, AND WEEKS OF VACATION: by Drug Detailman and Socio-economic Level of Zone Visited: Peru, 1964

| DRUG DETAILMEN,<br>BY SOCIO-ECONOMIC<br>LEVEL OF ZONE<br>VISITED | PATIENTS SEEN<br>PER HOUR | FEE CHARGED PER<br>VISIT (soles) |               | WEEKS OF<br>VACATION<br>PER YEAR |
|--|---------------------------|----------------------------------|---------------|----------------------------------|
|  |                           | Generalist                       | Specialist    |                                  |
| low  | 3                         | 25                               | -             | 1.5                              |
| low  | 2                         | 20                               | -             | 0                                |
| low  | 2                         | 40                               | -             | 0                                |
| low  | 2                         | 30                               | 60            | 1.5                              |
| low  | 2                         | 40                               | 50            | 2                                |
| low  | 1.5                       | 30                               | -             | 0                                |
| middle   | 1.6                       | 80                               | 100           | 0                                |
| middle   | 2                         | 40                               | 75            | 1                                |
| high   | 2                         | 75                               | 125           | 2                                |
| high   | 3                         | 100                              | 150           | 4                                |
| high   | 1                         | 100                              | -             | 4                                |
| high   | 2                         | 75                               | 150           | 2                                |
| <b>AVERAGE</b>   | <b>2.0</b>                | <b>55</b>                        | <b>101</b>    | <b>1.5</b>                       |
| <b>AVERAGE RANGE<sup>a</sup></b>                                 | <b>1.2-2.9</b>            | <b>34-83</b>                     | <b>70-144</b> | <b>1.0-2.0</b>                   |

<sup>a</sup>These are the averages of the maximum and minimum estimates given by the detailmen. In other words, for "patients seen per hour", the 12 detailmen collectively thought it very unlikely that the true average would go below 1.2 visits or exceed 2.9 visits per hour.

After explaining the purpose of the health manpower study and the nature of the information desired, the detailmen wrote down separately and anonymously their estimates of the average number of patients seen per hour, fee charged, and weeks of vacation taken annually by the physicians visited in their zone. In order to have some indication of the potential error that might arise, they were asked to indicate the upper and lower range of their estimates.

As will be noted, the estimates vary considerably depending on the socio-economic level of the zone visited. Since each man was responsible for approximately the same number of physicians, the average of all of the estimates for a given item automatically provides a weighted average for the physicians of the capital.

A panel of physicians was also convened in order to develop the same planning estimates as did the pharmaceutical company representatives. Despite careful selection of panel members, however, the Planning Office was unable to convince enough of them of the relevance of this type of information to health manpower to gain their cooperation.

Another technique employed consisted of having personnel of the Planning Office contact their personal friends, explain to them the nature of the study, and ask them about the characteristics of their own private practice. Though the number contacted was small (12 general practitioners and 10 specialists, all in Lima and Callao), the reliability of response was considered good. The average fee and number of patients attended per hour are as follows:

| TYPE OF PRACTICE<br>(Lima and Callao) | AVERAGE        |                      |
|---------------------------------------|----------------|----------------------|
|                                       | Fee<br>(soles) | Patients<br>per hour |
| General                               | 43             | 2.3                  |
| Specialty                             | 95             | 1.7                  |

These results are in close agreement with the estimates made by the drug detailmen for Lima physicians.

Outside of Lima the Planning Office depended on estimates made by knowledgeable physician-informants in 17 of the communities visited in connection with the census of health manpower. Since this portion of the study was carried out only towards the end of the census, it was possible to survey only a limited number of communities in this manner. The averages reported in this survey are given below:

| LOCATION OF RESPONDENT<br>(Provinces only) | AVERAGE        |                      |
|--|----------------|----------------------|
|  | Fee<br>(soles) | Patients<br>per hour |
| Coast (9 respondents)                      | 41             | 3.1                  |
| Mountains and Jungle<br>(8 respondents)    | 28             | 2.2                  |

Additional information on the average fee charged for a medical consultation was obtained in three community studies carried out on the demand for health services. Dividing the total amount paid to physicians by the number of paid consultations provided yet another method of verifying the accuracy of the estimates used in constructing the model. The results obtained in the three community studies were as follows:

| TOWN AND REGION     | NO. OF PAID CONSULTATIONS | AVERAGE FEE PAID (soles) |
|---------------------|---------------------------|--------------------------|
| Huacho (coast)      | 538                       | 34                       |
| Sicuani (mountains) | 174                       | 34                       |
| Tarapoto (jungle)   | 161                       | 22                       |

If the planning estimates had been obtained by only one of the methods described there would have been little reason to be confident in the resulting model of the private sector. Fortunately, however, several methods were used and each one gave similar results. The results obtained by the several methods used in metropolitan Lima were averaged while in the provinces somewhat more importance was given to the observations obtained in coastal communities, where the majority of provincial physicians are located. Table 2 summarizes the assumptions used (the number of hours worked is discussed further on).

Table 2. ASSUMPTIONS USED FOR DEVELOPING A MODEL OF PRIVATE MEDICAL PRACTICE: Peru, 1964

| ITEM  | METROPOLITAN LIMA | REST OF PERU |
|---|-------------------|--------------|
| <u>Patients seen per hour</u>   |                   |              |
| in general practice   | 2.2               | 2.8          |
| in specialty practice   | 1.7               | -            |
| <u>Fee charged per patient (soles)</u>  |                   |              |
| in general practice   | 50                | 37           |
| in specialty practice   | 97                | -            |
| <u>Correction factor for income derived from hospital and other services (full-time private practitioners in Lima only)<sup>a</sup></u> |                   |              |
| in general practice   | 1.15              | -            |
| in specialty practice   | 1.30              | -            |
| <u>Weeks of annual vacation</u>   | 2                 | 2            |

<sup>a</sup>The estimated income from office practice was multiplied by the appropriate factor. It was used only for full-time Lima practitioners on the assumption that few other physicians would care for private hospital patients.

Salaried Practice

The amount earned in salaried practice was estimated from detailed cost studies carried out by the Planning Office in a variety of Ministry of Health facilities, in three hospitals administered by the Workers' Fund, and in two charity hospitals. Less precise information was obtained from other sources for several private industrial hospitals and for the employees' and armed and police forces' systems. The mean salary levels for the several systems were weighted in accord with the number of doctors working in each system and then combined to obtain the composite monthly and hourly incomes summarized below.

| EMPLOYMENT CATEGORY         | METROPOLITAN LIMA | REST OF PERU |
|-----------------------------|-------------------|--------------|
| Full-time (soles per month) | 12,000            | 10,000       |
| Part-time (soles per hour)  | 75                | 60           |

Number of Hours Worked

Assumptions about the number of hours worked per week were based on information obtained in the physician census. To make the estimate for each work situation as valid as possible, all physicians not providing complete information on the number of hours worked or with a teaching appointment were excluded from analysis. Using these criteria, 2845 (54%) census forms were analyzed. For each work situation, the number of census forms that met these rigid criteria and the average number of hours worked weekly were:

| WORK SITUATION        | METROPOLITAN LIMA |       | REST OF PERU |       |
|-----------------------|-------------------|-------|--------------|-------|
|                       | Number            | Hours | Number       | Hours |
| Salaried job only     | 601               | 40.0  | 528          | 41.3  |
| Private practice only | 113               | 23.1  | 51           | 33.1  |
| <u>Both</u>           | 909               |       | 643          |       |
| from salaried job     |                   | 31.7  |              | 32.3  |
| from private practice |                   | 14.7  |              | 19.0  |

**Appendix G. METHOD OF ESTIMATING THE NUMBER OF FOREIGN MEDICAL DEGREE VALIDATIONS**

The results of the survey of medical schools are given in Tables 1 and 2.

**Table 1. FOREIGN MEDICAL GRADUATES OF PERUVIAN NATIONALITY, 1957-62; FOREIGN MEDICAL DEGREES VALIDATED IN PERU, 1958-63; ESTIMATED RETURN RATE TO PERU OF PERUVIAN GRADUATES OF FOREIGN MEDICAL SCHOOLS; by Country or Region**

| COUNTRY OR REGION | MEDICAL SCHOOLS    |           | FOREIGN MEDICAL GRADUATES OF PERUVIAN NATIONALITY 1957-62 <sup>a</sup> | DEGREES VALIDATED IN PERU 1958-63 <sup>a</sup> | % RETURNING <sup>b</sup> |
|-------------------|--------------------|-----------|--|--|--------------------------|
|                   | Sent Questionnaire | Responded |  |  |                          |
| Argentina         | 6                  | 5         | 198  | 161  | 81                       |
| Bolivia           | 3                  | 2         | 2  | 14   | (c)                      |
| Brazil            | 6                  | 4         | 24   | 21   | 88                       |
| Chile             | 3                  | 3         | 8  | 5  | 63                       |
| Rest of L.A.      | 7                  | 5         | 2  | 0  | 0                        |
| Spain             | 10                 | 2         | 32   | 0  | 0                        |
| Rest of world     | 0                  | 0         | --   | 20   | --                       |
| <b>TOTAL</b>      | <b>35</b>          | <b>21</b> | <b>266</b>   | <b>221<sup>d</sup></b>                         | <b>71</b>                |

<sup>a</sup>The two six-year periods are staggered one year on the assumption that generally there will be a lapse of one year between graduation in a foreign country and validation of the degree in Peru.

<sup>b</sup>These estimates are probably high since the denominator, the number of graduates of Peruvian nationality, is a minimum estimate. The overall return rate, 71 percent, is based only on Spain and Latin America, excluding Bolivia.

<sup>c</sup>Calculation of a return rate is meaningless. The graduates not reported were likely from the school at La Paz which did not return the questionnaire.

<sup>d</sup>Only one non-Peruvian validated a foreign degree during the six-year period. The migration of non-Peruvian doctors to Peru can therefore be ignored as a significant source of error.

Table 2. PERUVIANS STUDYING MEDICINE ABROAD, BY YEAR OF STUDY;  
NUMBER EXPECTED TO RETURN TO PERU

| YEAR | YEAR OF STUDY | PERUVIAN MEDICAL STUDENTS |                  |  | YEAR EXPECTED IN PERU |
|------|---------------|---------------------------|------------------|--|-----------------------|
|      |               | Enrolled in class         | Est. % finishing | Exp. to return on graduation (71% ret. rate) |                       |
| --   | --            | --                        | --               | 60   | 1964                  |
| 1963 | Internship    | 82                        | 100              | 58   | 1965                  |
| 1963 | 5th           | 65                        | 95               | 44   | 1966                  |
| 1963 | 4th           | 202                       | 90               | 129  | 1967                  |
| 1963 | 3rd           | 126                       | 80               | 72   | 1968                  |
| 1963 | 2nd           | 157                       | 65               | 72   | 1969                  |
| 1963 | 1st           | 194                       | 50               | 69   | 1970                  |
| 1964 | 1st           | 194                       | 50               | 69   | 1971                  |
| 1965 | 1st           | 194                       | 50               | 69   | 1972                  |
| 1966 | 1st           | 194                       | 50               | 69   | 1973                  |
| ALL  |               | 1408                      | 65               | 711  | 1964-73               |

<sup>a</sup>Based on actual enrollment in the respondent schools for the year 1963 and assuming the same first year enrollment for Peruvians in the period 1964-66 as existed in 1963.

In 1963 there were 67 Peruvians enrolled in the first year of medicine at the University of Madrid (Spain) and an average of 14 in each of the succeeding years. This probably is due more to dropouts after the first year and repetition of studies than a recent tendency for more Peruvians to study medicine in Madrid. Independent and authoritative sources suggest that the recorded total enrollment of 330 Peruvians at the Faculty of Medical Sciences in Buenos Aires is low by about 200 since the procedure used for recording citizenship information makes it difficult to identify all students of a given nationality.

Since the survey did not find all Peruvians studying medicine abroad, the estimate of 711 validations in the next decade is likely conservative. As a somewhat better approximation, 750 validations are assumed.

Appendix B.. MIDWIFE INCOME ESTIMATES

Private Practice

Hours required per delivery attended. Approximately 20 midwives from all over Peru were asked to estimate the average working time they spent in relation to each delivery attended. Most respondents gave a range of six to eight hours and the variation between different estimates was surprisingly small. The compromise value of seven hours includes pre- and post-partum care, but since the majority of midwives indicated that their services were solicited only at the time partuition, relatively little time was spent in these activities.

Fee charged per delivery. The authorized fee for reimbursing persons insured by the Employees' Fund for a private delivery was 500 soles in 1964. Representatives of the midwifery profession working in Lima and Callao considered this amount "outdated" and "needing revision", though they conceded that the actual fee charged was often lower in the capital and lower still in the provinces. Reflecting this situation, 350 soles (\$13.05) was used as the assumed average fee per delivery. Untrained midwives reportedly charged between 10 and 50 soles.

Weeks worked per year: 50.

Hours worked per week. For those exclusively in private practice, 21 hours; for those with both private practice and a salaried job, 13 hours in the former activity and full-time in the latter one. These estimates were based on census data.

**Salaried Practice**

Table 1 gives the estimated gross monthly salary for midwives employed in each of the six systems of health care. The total earned by all salaried midwives (S/. 2,677,400), was then divided by the number so employed (699), to obtain the average income per salaried midwife (S/. 3,800).

Table 1. BASES FOR ESTIMATING THE AVERAGE MONTHLY SALARY FOR EMPLOYED MIDWIVES: Peru, 1964

| EMPLOYER              | MONTHLY SALARY | MIDWIVES EMPLOYED | TOTAL MONTHLY SALARY |
|-----------------------|----------------|-------------------|----------------------|
| Ministry of Health    | S/. 3000       | 340               | S/. 1,020,000        |
| Employees' Insurance  | 5500           | 107               | 588,500              |
| Workers' Insurance    | 5000           | 75                | 375,000              |
| Armed & Police Forces | 4500           | 37                | 166,500              |
| Charity institutions  | 2700           | 57                | 153,900              |
| Private institutions  | 4500           | 83                | 373,500              |
| <b>TOTAL</b>          | -              | <b>699</b>        | <b>2,677,400</b>     |

Appendix .I. VOLUME AND PRODUCTIVITY ESTIMATES FOR PHYSICIAN  
VISITS AND HOSPITAL DISCHARGES

Services produced by public sector agencies and private institutions were obtained by the Planning Office in connection with the preparation of the National Health Plan. The number of visits produced in the private sector outside of respondent institutions was estimated by multiplying (1) a weighted average of hourly productivity of Lima and provincial physicians (2.4 visits per hour), times (2) the estimated number of hours worked each week in private offices (55,300), times (3) 50 weeks worked per physician per year, times (4) a factor to account for home visits (1.067). This last factor represents an assumed ratio of one home visit per 15 office visits.

Table 1 gives the volume of services produced, by system of health care, and the estimated physician and bed productivity.

Table 1. DISTRIBUTION OF ESTIMATED NUMBER OF DOCTOR VISITS AND HOSPITAL DISCHARGES; DISCHARGES PER BED YEAR; VISITS AND DISCHARGES PER FULL-TIME EQUIVALENT DOCTOR-YEAR: by Sector and System of Health Care: Peru, 1964

| SYSTEM OF HEALTH CARE<br>OR LOCATION OF SERVICE | DOCTOR VISITS |      | HOSPITAL DISCHARGES |      |                  | SERVICES PER F.T.E.<br>DOCTOR-YEAR <sup>b</sup> |            |
|---|---------------|------|---------------------|------|------------------|---|------------|
|   | No.<br>(000s) | %    | No.<br>(000s)       | %    | Per bed-<br>year | Visits  | Discharges |
| ALL   | 16,100        | 100  | 390                 | 100  |                  | 3100  | 70         |
| <b>Public Sector<sup>a</sup></b>                | (7,980)       | (49) | (328)               | (84) |                  | (2300)  | (90)       |
| Ministry of Health                              | 3,190         | 20   | 132                 | 34   | 14               | 2400  | 100        |
| Employees' Insurance                            | 570           | 4    | 25                  | 6    | 23               | 1400  | 60         |
| Workers' Insurance                              | 1,830         | 11   | 53                  | 14   | 20               | 3300  | 100        |
| Armed and police                                | 1,020         | 6    | 19                  | 5    | 10               | 2000  | 40         |
| Charity   | 1,300         | 8    | 99                  | 25   | 12               | 2200  | 160        |
| Other   | 70            | 0    | -                   | -    | -                | 900   | -          |
| <b>Private Sector</b>                           | (8,120)       | (51) | (62)                | (16) | (17)             | (5000)  | (40)       |
| Hospital or clinic                              | 1,040         | 7    | 62                  | 16   | 17               | -   | -          |
| Office or home                                  | 7,080         | 44   | -                   | -    | -                | -   | -          |

<sup>a</sup>Peru, Min. de Salud Publica y A.S., Of. Sect. de Planif. Plan Nacional de Salud, 1966-1970  
Based on Tables 5-6, and 9-10.

<sup>b</sup>F.T.E. status equals 41 hours (i.e., total of reported and imputed hours worked per week divided by 5235 doctors). Doctor-hours worked in each system of health care (including adjustment for teaching hours), divided by 41 gives the estimated number of F.T.E. doctors employed, and this number divided into the services produced gives the services per doctor-year.

Appendix J. ASSUMPTIONS USED TO ESTIMATE DEMAND BY INSURED PERUVIAN WORKERS AND EMPLOYEES AND THEIR AMERICAN ANALOGS

Insured Workers

Data were obtained from the Workers' Fund on the number of insured workers, physician visits, hospital discharges, and hospital bed-days for the years 1960 through 1964. However, for reasons described below, it was necessary to adjust the denominatory (insured) population in order to compensate for probable underestimation.

The method of payment used in the Workers' Fund calls for the employer to deduct three percent of each worker's weekly pay and to send this amount, along with his own contribution of six percent, to the Fund. Eventually the government adds its share, amounting to two percent. In lieu of the premium paid, a stamp is placed in the insurance booklet issued to each worker, certifying him as paid up and hence authorized to receive health and welfare benefits. Under this arrangement, both worker and employer frequently find it advantageous to not make the weekly payments, bringing the booklet up to date only when the worker is in need of service.

Since the insured population (number of worker-years) is estimated by dividing the number of paid-up weeks by 52, this means that utilization rates will tend to overstate the actual demand for services. Officials of the Fund estimate that about 15-20 percent of the weeks actually worked in recent years were not paid for. Accordingly, the unadjusted insured population has been increased 20 percent to correct (approximately) for the underpayment of premiums.

Insured Employees

In reporting the volume of services provided to beneficiaries for the years 1960 through 1964, the Employees' Fund made no distinction between employees and wives of employees entitled to maternity benefits only. Accordingly, estimates of the per capita utilization of services were apt to be high if "wives" were omitted from the denominator population, and low if they were included. In order to at least partially avoid these errors, it was assumed that the wife of an employee demanded about one-sixth of the services as her husband and hence the number of beneficiary employees was increased by that proportion of the number of wives.

American Analogs to Insured Peruvian Workers and Employees

In 1960 the age and sex distribution of insured Peruvian workers was as follows:

| AGE GROUP | % OF INSURED | % MALE |
|-----------|--------------|--------|
| Under 20  | 9.9          | 80     |
| 20-39     | 68.4         | 87     |
| 40-59     | 21.6         | 87     |
| Over 59   | 0.1          | 92     |

Comparable information was not available for insured employees.

Data obtained from the U.S. National Health Survey on utilization of physician visits and hospital care by Americans is grouped according to the following age and income groups:

Age: Under 5; 5-14; 15-24; 25-44; 45-64; 65+

Income: Under \$2000; \$2-3999; \$4-6999; \$7000+; Unknown.

In developing American analogs to insured Peruvian workers and employees, the U.S. National Health Survey data were given weights,

as follows:

For Workers

Sex: Rates for males multiplied by 9; for females, by 1;  
total divided by 10.

Age: Rates for ages 15-44 given three times the weight  
as for ages 45-64.

Income: \$2000 - 3999.

For Employees

Sex: Rates for males multiplied by 7; for females, by 3;  
total divided by 10.

Age: Same as for workers.

Income: \$4000 - 6999.

Sources of Data:

Physician Visits: U.S. National Health Survey. Volume of Physician Visits by Place of Visit and Type of Service, United States, July 1963 - June 1964, Series 10, No. 18, Washington, D.C., G.P.O., 1965.  
Table 7, p. 19.

Average Length of Stay: U.S. National Health Survey. Hospital Discharges and Length of Stay: Short-stay Hospitals, United States, 1958-1960. Series B-No. 32, Washington, D.C., G.P.O., 1962. Table 12, p. 25.

Discharges per 100: Ibid., Table 11, p. 24.

**Appendix K. ASSUMPTIONS AND METHODS USED TO ESTIMATE THE COST OF THE HEALTH SECTOR IN 1964**

Table 1 gives the estimated distribution of health and health-related expenditures in 1964. The sources of information and assumptions used are given in the footnotes.

**Table 1. ESTIMATED HEALTH EXPENDITURES: by Expenditure Category: Peru, 1964**

| EXPENDITURE CATEGORY                        | EXPENDITURES              |   |             |              |
|---|---------------------------|---|-------------|--------------|
|   | millions of soles         | %   |             |              |
| <b>Personnel Category</b>                   | <b>Number<sup>a</sup></b> | <b>Assumed monthly income<sup>b</sup></b> |             |              |
| Physicians                                  | 5235                      | 15000                                     | 942         | 23.5         |
| Dentists                                    | 1685                      | 8000                                      | 162         | 4.0          |
| Pharmacists                                 | 275                       | 5000                                      | 17          | 0.4          |
| Nurses                                      | 3103                      | 3200                                      | 119         | 3.0          |
| Midwives                                    | 885                       | 4500                                      | 48          | 1.2          |
| Other profs.                                | 500                       | 5000                                      | 30          | 0.7          |
| Auxil. nurses                               | 9119                      | 2000                                      | 219         | 5.5          |
| Techs. or equivalent                        | 1288                      | 2200                                      | 34          | 0.8          |
| Admin. and service                          | 24100                     | 1700                                      | 492         | 12.3         |
| <b>PERSONNEL</b>                            |                           |   | <b>2063</b> | <b>51.5</b>  |
| <b>MEDICINES<sup>c</sup></b>                |                           |   | <b>1160</b> | <b>29.0</b>  |
| <b>OTHER OPERATING EXPENSES<sup>d</sup></b> |                           |   | <b>370</b>  | <b>9.2</b>   |
| <b>CAPITAL INVESTMENTS<sup>e</sup></b>      |                           |   | <b>410</b>  | <b>10.3</b>  |
| <b>TOTAL</b>                                |                           |   | <b>4003</b> | <b>100.0</b> |

<sup>a</sup>For professional, technical and auxiliary personnel, the number found active in the manpower census, rounded off to the nearest 50. Only public sector pharmacists are counted since the rest are assumed to have been paid secondary to the sale of medicines. For administrative and service personnel: 20,500 positions of this type budgeted in the public sector (Table 8, p. 17, Plan Sectorial de Salud, Dec. 1966); plus 400 positions assumed for educational institutions preparing health workers (212 worked in the medical schools alone); plus 3900 positions estimated for private sector institutions, assuming a similar employee-bed ratio to that found in the Workers' Fund; minus an assumed 3% vacancy rate; equals 24,100 filled positions.

<sup>b</sup>Based on average prevailing salary scales, weighted according to the number of employees of each type working in the several systems of health care. For the independent professions, estimated salary income was added to that earned in the private sector and from academic positions.

<sup>c</sup>The market value of pharmaceutical products manufactured in Peru was 751 million soles (Inst. Nac. de Promocion Industrial y Banco Industrial del Peru. Situacion de la Industria Peruana en 1964. Lima, 1965, Table 63, p. 182) and the value (to the importer) of foreign products was 417 million soles (Inst. Nac. de Planif. La Evolucion de la Economia en el Periodo 1950-64. Vol. II, "Comercio Exterior", Lima (May 1966), Table 48, p. 120). The latter amount was increased by an assumed 30% markup and the combined total reduced by about 10% to account for products sold for non-human use, giving a final estimate of 1160 million soles (\$43 million).

<sup>d</sup>Detailed cost studies were conducted in a variety of institutions. In these studies, "other expenses", expressed as a percentage of the amount expended on personnel, varied from about 50 percent in small charity hospitals, to 20 percent in medium-sized and large hospitals with relatively adequate services, to slightly more than 10 percent in ambulatory care facilities. Applying these percentages to the approximate personnel costs of each of these types of facilities gives the estimate of 350 million soles. This category includes all operating expenses except salaries and medicines. An additional 20 million soles are included in this category as the amount likely spent by the educational institutions for non-personnel expenses (15% of the combined operating budgets of 130 million soles).

<sup>e</sup>The gross formation of capital amounted to an estimated 255 million soles for health facilities and 155 million soles for water and sewage systems (Table 15, p. 45, Plan Sectorial de Salud, Dec. 1966). Capital investment in private sector facilities and in health-related educational institutions, although unknown, was not great.

Appendix II. STANDARDS AND ASSUMPTIONS USED TO ESTIMATE THE DEMAND FOR HEALTH MANPOWER

The personnel standards for the principal instruments of health policy are given in Table 1. The bases for and assumptions underlying each of these standards are as follows:

Short-stay Bed (Col. 1). Includes personnel necessary to provide inpatient care in government general hospitals. The standard is based on model hospitals of 136 beds and 236 beds, designed to serve populations of 50,000 and 85,000, respectively. In 1964 about 65 percent of all public general beds were in large hospitals; the composite standard given contemplates a 50:50 ratio in 1984. The average bed turnover rate is estimated at 27 per year and the standard includes sufficient personnel to provide about 33 immunizer-hours and 24 home visitor-hours, ratios adequate to meet the estimated demand for these activities. The demand model assumes 33,690 public sector beds of this type in 1984.

Long-stay Bed (Col. 2). Based on models of the staff required by a 450-bed mental hospital and a 500-bed tuberculosis hospital. In 1964 the ratio of mental to tuberculosis beds was about 45:55; this ratio is to be reversed by 1984 and the standard is so weighted. Chronic disease beds accounted for 17 percent of all public sector beds in 1964; the projection for 1984 is 20 percent. The estimated bed turnover is 1.5 and the standard includes personnel to provide 14 doctor-hours and 2 dentist-hours per bed-year at an hourly output of 3 and 2 visits, respectively. A total of 9860 chronic disease beds are assumed.

Doctor- and Dentist-hour (Cols. 3 and 4). These standards are applicable either to hospital outpatient services or to polyclinics not associated with hospitals. According to the general hospital models, approximately 125 doctor-hours and 18 dentist-hours are to be provided per bed-year. Assumed output per hour is four visits for physicians and two visits for dentists.

Medical Post (Col. 5). Eight maternity and emergency beds per post are assumed with a bed turnover of 27. Posts are designed to serve the needs of communities of 2000 to 5000+ inhabitants. The two staff doctors will provide limited hospital care, about 2290 hours of ambulatory care, and supervise health posts in their region. About 720 units are projected for 1984.

Health Post (not shown). Staffed only by a sanitarario, about 1010 posts are projected to serve populations of 500 to 2000 inhabitants.

Table 1. PUBLIC SECTOR PERSONNEL STANDARDS FOR INPATIENT AND OUTPATIENT SERVICES; PRIVATE SECTOR PERSONNEL STANDARDS FOR HOSPITALS: Peru, 1984

| PERSONNEL<br>CATEGORY | HOURS REQUIRED PER UNIT IN THE PUBLIC SECTOR |                      |             |             |             |                      | PRIVATE HOSPITALS  |             |
|-----------------------|--|----------------------|-------------|-------------|-------------|----------------------|--------------------|-------------|
|                       | Per Bed-Year                                 |                      | Doctor-     | Dentist-    | Medical     | Sanit.               | Hours per Bed-Year |             |
|                       | Short-<br>stay<br>(1)                        | Long-<br>stay<br>(2) | hour<br>(3) | hour<br>(4) | Post<br>(5) | Insp.<br>hour<br>(6) | 1964<br>(7)        | 1984<br>(8) |
| ALL                   | 2543.5                                       | 1235.2               | 6.176       | 2.203       | 17680       | 1.716                | 853 <sup>a</sup>   | 2391        |
| Physician             | 148.9  | 76.0                 | 1.191       | 0.023       | 3120        | 0.011                | 121                | 125         |
| Dentist               | -  | 2.2                  | -           | 1.000       | -           | -                    | 11                 | 12          |
| Pharmacist            | 9.5  | 7.7                  | 0.048       | 0.026       | -           | -                    | 14                 | 15          |
| Nurse                 | 402.8  | 177.1                | 0.200       | 0.023       | -           | -                    | 129                | 200         |
| Midwife               | 42.2   | -                    | 0.041       | -           | -           | -                    | 48                 | 50          |
| Social Worker         | 6.0  | 14.9                 | 0.118       | -           | -           | -                    | 4                  | 5           |
| Diet. & Nut.          | 14.2   | 5.5                  | 0.003       | -           | -           | -                    | 4                  | 7           |
| Lab Tech.             | 22.5   | 19.8                 | 0.269       | -           | 1820        | 0.009                | 18                 | 35          |
| X-ray Tech.           | 8.4  | 4.0                  | 0.195       | 0.023       | -           | -                    | 15                 | 20          |
| Occup. Therapist      | -  | 17.8                 | -           | -           | -           | -                    | -                  | -           |
| Physic. Therapist     | 9.1  | -                    | 0.059       | -           | -           | -                    | -                  | 2           |
| Sanit. Insp.          | -  | -                    | -           | -           | 1820        | 1.000                | -                  | -           |
| Auxil. Nurse          | 693.0  | 312.4                | 1.695       | 0.583       | 7280        | -                    | 489                | 500         |
| Auxil. Pharm.         | 16.4   | 9.4                  | 0.096       | 0.020       | -           | -                    | -                  | 20          |
| Admin.                | 307.7  | 126.2                | 0.874       | 0.383       | -           | 0.248                | a                  | 400         |
| Service               | 862.8  | 462.2                | 1.387       | 0.122       | 3640        | 0.448                | a                  | 1000        |

<sup>a</sup>Excluding administration and service personnel, for which reliable estimates are not available.

Sanitary Inspector-hour (Col. 6). Since requirements for sanitary inspectors were developed independently of bed or other facility requirements, a separate standard was prepared. A detailed estimate was made of the number of environmental sanitation services appropriate for a model community of 40,000, two-thirds of which was urban. Conversion into the number of sanitary personnel required gave a ratio of 1.7 inspectors per 10,000 inhabitants. This was considered too ambitious, particularly in view of the large rural population, and hence was revised to one sanitary inspector per medical post (720) and one sanitary inspector per 10,000 population in districts with 10,000+ urban inhabitants (about 1097 in 1984).

Private Hospital Bed (Cols. 7 & 8). The standard is based on an estimate of changes likely to occur by 1984. Since it includes the manpower necessary to provide outpatient care (except for fee-for-service doctors and dentists) the standards for some personnel categories are well above those in Cols. 1 and 2. Total number of beds estimated is 7590.

Sanitary Engineers (not shown). The standards for public sector sanitary engineers (S.E.), followed in parentheses by the estimated 1984 requirements, are as follows: one S.E. per three million soles of water and sewage projects (228); one S.E. per city water and sewage authority, except in some cities where more are required (220); two S.E.'s per Health Area (58); five S.E.'s for the Department of Lima, lesser numbers for several other populous departments, and one each for the rest (84); and about 48 in teaching and other governmental responsibilities by 1984.

Table 2 gives the working estimates of the personnel required for each component of the demand model. Obviously, carrying figures out to units should not be interpreted to imply accuracy at this level; projections given in the text are generally rounded off to the nearest 100. "Administrative and Service Personnel" were included in the model only to make it possible to project total sectoral costs and should be considered as very approximate. The estimates given of the number of administrative and service required in the "education" and "central administration and institutes" categories assume maintenance of the 1964 ratio between these personnel and the number of professionals similarly employed.

Table 2. WORKING TABLE OF THE ESTIMATED MANPOWER DEMAND ACCORDING TO THE MODEL: by Sector and Type of Activity: Peru, 1984<sup>a</sup>

| PERSONNEL        | NUMBER OF FULL-TIME EQUIVALENT PERSONNEL <sup>b</sup> IN |                                   |                         |                         |                |                 |                     |           |
|------------------|--|-----------------------------------|-------------------------|-------------------------|----------------|-----------------|---------------------|-----------|
|                  | Total  | Public Sector                     |                         |                         |                | Private Sector  |                     | Education |
|                  |  | Central<br>admin. &<br>institutes | Short-stay<br>inpatient | Long-<br>stay<br>hosps. | Ambul.<br>care | Hosp.-<br>based | private<br>practice |           |
| (1)              | (2)  | (3)                               | (4)                     | (5)                     | (6)            | (7)             | (8)                 |           |
| ALL              | 115,386  | 3,287                             | 48,167                  | 6,639                   | 34,717         | 9,903           | 9,798               | 2,175     |
| Physicians       | 13,895   | 518                               | 2,700                   | 360                     | 5,321          | 456             | 4,001               | 539       |
| Dentists         | 3,440  | 47                                | 0                       | 12                      | 661            | 50              | 2,600               | 70        |
| Pharmacists      | 3,326  | 56                                | 176                     | 42                      | 225            | 62              | 2,707               | 58        |
| Nurses           | 10,711   | 66                                | 7,456                   | 959                     | 882            | 834             | 100                 | 414       |
| Midwives         | 1,446  | 2                                 | 781                     | 0                       | 178            | 208             | 240                 | 37        |
| Sanit. Engs.     | 638  | 476                               | 0                       | 0                       | 142            | 0               | -                   | -         |
| Social Workers   | 791  | 66                                | 111                     | 81                      | 512            | 21              | -                   | -         |
| Health Educs.    | 232  | 36                                | 0                       | 0                       | 195            | 0               | 0                   | 1         |
| Other profs.     | 200  | -                                 | -                       | -                       | -              | -               | -                   | -         |
| Diet. & Nuts.    | 374  | 34                                | 263                     | 30                      | 13             | 29              | 0                   | 5         |
| Lab. Techs.      | 2,115  | 165                               | 416                     | 107                     | 1,166          | 146             | 100                 | 15        |
| X-ray Techs.     | 1,223  | 43                                | 155                     | 22                      | 860            | 83              | 50                  | 10        |
| Other Techs.     | 500  | -                                 | -                       | -                       | -              | -               | -                   | -         |
| Occup. Thers.    | 99   | 0                                 | 0                       | 96                      | 0              | 0               | 0                   | 3         |
| Physic. Thers.   | 436  | 0                                 | 168                     | 0                       | 255            | 8               | 0                   | 5         |
| Sanit. Insp.     | 1,822  | 0                                 | 0                       | 0                       | 1,817          | 0               | 0                   | 5         |
| Aux. Nurses      | 27,221   | 0                                 | 13,597                  | 1,692                   | 9,847          | 2,085           | 0                   | 0         |
| Aux. Pharms.     | 866  | 0                                 | 303                     | 51                      | 429            | 83              | 0                   | 0         |
| Sanitarios       | 1,010  | 0                                 | 0                       | 0                       | 1,010          | 0               | 0                   | 0         |
| Admin. & Service | 45,041   | 1,778                             | 22,041                  | 3,187                   | 11,204         | 5,838           | 0                   | 993       |

<sup>a</sup>A dash (-) indicates that no individual estimate was made for the category. Column (2) includes personnel required for central and regional-level administration; columns (3) through (8) include personnel necessary for local and institutional administration.

<sup>b</sup>Assumes 2080 hours per physician per year and 1820 hours per year for all other types of personnel.

Appendix M. COST PROJECTIONS OF THE DEMAND MODEL

The assumptions used to estimate the 1984 cost (in 1964 soles) of the demand model are given in Table 1.

Table 1. ESTIMATED HEALTH EXPENDITURES: by Expenditure Category: Peru, 1984

| RESOURCE                                    | REQUIRED BY 1984<br>ACCORDING TO<br>DEMAND MODEL     | ASSUMED EXPENDITURES IN 1984<br>(in 1964 soles) |                            |
|---|--|---|----------------------------|
|   |  | Per Person<br>per year <sup>a</sup>             | Total (mills.<br>of soles) |
| Physicians                                  | 13,895   | 325,100   | 4,517                      |
| Dentists                                    | 3,440  | 173,400   | 596                        |
| Pharmacists <sup>b</sup>                    | 619  | 108,400   | 67                         |
| Nurses                                      | 10,711   | 69,300  | 742                        |
| Midwives                                    | 1,446  | 97,500  | 141                        |
| Other profs <sup>c</sup>                    | 1,633  | 108,400   | 177                        |
| Techs. or equiv. <sup>d</sup>               | 6,569  | 47,700  | 313                        |
| Auxils. or equiv. <sup>e</sup>              | 29,097   | 43,300  | 1,260                      |
| Admin. & service                            | 45,041   | 36,800  | 1,658                      |
| <b>PERSONNEL</b>                            | <b>112,451</b>                                       |   | <b>9,451</b>               |
|   | <b>Units of Investment<br/>(1965-84)<sup>f</sup></b> | <b>Per Unit</b>                                 |                            |
| <b>Hospital Beds</b>                        |  |   |                            |
| New   | 30,000   | 300,000   | 765                        |
| Remodelled                                  | 15,000   | 100,000   | 128                        |
| Polyclinic spaces                           | 1,700  | 300,000   | 43                         |
| Medical Posts                               | 660  | 600,000   | 34                         |
| Health Posts                                | 970  | 200,000   | 16                         |
| <b>HEALTH FACILITIES<sup>g</sup></b>        |  |   | <b>986</b>                 |
| <b>ENVIRONMENTAL SANITATION<sup>g</sup></b> |  |   | <b>700</b>                 |
| <b>GOODS AND SERVICES<sup>h</sup></b>       |  |   | <b>43</b>                  |
| <b>TOTAL</b>                                |  |   | <b>18,000</b>              |

<sup>a</sup>Assumes a 3% real annual increase in salaries above the 1964 level. For reasons given in the text, the bases do not exist to assign differential rates for each personnel category.

<sup>b</sup>Includes only pharmacists employed by the public sector and educational institutions, the remainder being assumed to derive their income secondary to the sale of medicines.

<sup>c</sup>Includes social workers, sanitary engineers, health educators, veterinarians, psychologists, lawyers, biologists, etc., working in the health sector. Two categories of sanitary engineers are excluded: (1) those working on new sanitation projects (228), since their salaries are included elsewhere (under "capital investments"); (2) those working in the private sector since they constitute a part of the construction and housing industries.

<sup>d</sup>Includes technicians, therapists, dieticians, sanitary inspectors.

<sup>e</sup>Besides all types of auxiliaries, includes sanitarios.

<sup>f</sup>Represents only the new investments required and not the total number of beds, posts, etc., necessary. A "polyclinic space" refers to the approximate investment required per full-time physician providing ambulatory care in a non-hospital facility.

<sup>g</sup>Estimates of gross formation of capital in 1984 are obtained by multiplying the total capital to be formed in the 1965-84 period, by 8.5%. The factor 8.5% represents the proportion of the total amount that must be formed in the 20th year (1984) assuming that annual capital formation bears a constant relationship to the gross national product. Unit costs for capital investments are those prevailing in 1964, it being assumed that productivity gains over the period will match increased costs of inputs. According to Plan Sectorial de Salud (Dec. 1966) estimates, the amount to be invested in environmental sanitation projects in the 1965-84 period is approximately 8238 million soles. The costs of educational facilities are excluded.

<sup>h</sup>This expenditure category (including medicines) is assumed to bear the same relation to the total (38%) in 1984 as in 1964.

Appendix N

LIST OF TEXT TABLES

|   | <u>Page</u> |
|---|-------------|
| INTRODUCTION  |             |
| Table 1. POPULATION DISTRIBUTION BY AGE:<br>Peru, 1940, 1960, 1980  | 11          |
| Table 2. NATIONAL POPULATION CLASSIFIED ACCORDING TO<br>SIZE OF URBAN COMMUNITY: Peru, 1964   | 13          |
| Table 3. STUDENTS ENROLLED IN INSTITUTIONS OF HIGHER<br>EDUCATION: NUMBER ENROLLED; DISTRIBUTION OF<br>ENROLLMENT BY FIELD OF STUDY; PERCENTAGE MALE:<br>by Year: Peru, 1960 & 1963 | 18          |
| Table 4. PROFESSIONAL SCHOOLS AND FACULTIES IN THE<br>HEALTH SECTOR: DURATION OF CURRICULUM:<br>Peru, 1966  | 19          |
| Table 5. TEN LEADING CAUSES OF DEATH IN DISTRICTS WITH<br>PROFESSIONAL CERTIFICATION: Peru, 1964  | 26          |
| Table 6. PERCENTAGE OF URBAN AND RURAL POPULATION WITH<br>POTABLE WATER AND SEWAGE DISPOSAL: Peru, 1965   | 27          |
| Table 7. TEN LEADING CAUSES OF PUBLIC SECTOR HOSPITAL<br>BED-DAYS AND AMBULATORY CARE VISITS: Peru, 1964  | 29          |
| Table 8. ARMED AND POLICE FORCES' HEALTH SERVICES:<br>Facilities and Coverage: Peru, 1964   | 39          |
| Table 9. NUMBER AND FUNCTIONS OF THE MAJOR TYPES OF NON-<br>HOSPITAL HEALTH FACILITIES OPERATED BY THE<br>MINISTRY OF HEALTH: Peru, 1956 and 1964                                   | 42          |
| Table 10. DISTRIBUTION OF PRIVATE SECTOR HOSPITAL BEDS BY<br>OWNERSHIP AND HOSPITAL SIZE: Peru, 1964  | 52          |
| Table 11. COMPARISON OF SELECTED CHARACTERISTICS OF THE<br>PUBLIC AND PRIVATE SYSTEMS OF HEALTH CARE:<br>Peru, 1964   | 53          |

| <b>Chapter 1. SUPPLY: GENERAL CONSIDERATIONS</b>   | <b>Page</b> |
|--|-------------|
| Table 1-1. ESTIMATED NUMBER OF PHYSICIANS SURVIVING TO 1964 (Life Table Method): Peru  | 73          |
| Table 1-2. ESTIMATED NUMBER OF ACTIVE PHYSICIANS IN 1964 AND 1974 (Cohort Method): Peru  | 78          |
| <br><b>Chapter 2. PHYSICIANS</b>   |             |
| Table 2-1. PERCENTAGE OF PHYSICIANS REMAINING ACTIVE: by Sex and Decade of Licensure: Peru, 1964                                     | 84          |
| Table 2-2. NUMBER OF ACTIVE PHYSICIANS AND POPULATION-PHYSICIAN RATIOS: by Population Group: Peru, 1964                              | 84          |
| Table 2-3. DISTRIBUTION OF ACTIVE PHYSICIANS BY EMPLOYMENT CATEGORY: Peru, 1964  | 86          |
| Table 2-4. DISTRIBUTION OF SALARIED PHYSICIANS AND AVERAGE HOURS WORKED PER WEEK: by Employer: Peru, 1964                            | 88          |
| Table 2-5. DOCTOR-HOURS PER BED-WEEK: by System of Health Care: Peru, 1964   | 89          |
| Table 2-6. PERCENTAGE DISTRIBUTION OF MEDICAL SPECIALTIES IN 1964 AND 1964/1957 SPECIALIST RATIOS: Peru                              | 90          |
| Table 2-7. ESTIMATED GROSS MONTHLY INCOME FOR PHYSICIANS: by Type of Work Situation and Location: Peru, 1964                         | 94          |
| Table 2-8. FULL-TIME EQUIVALENT FACULTY EMPLOYED AND DESIRED PER TEN STUDENTS: by Medical School: Peru, 1963                         | 110         |
| Table 2-9. MEDICAL SCHOOL FACULTY EMPLOYED IN 1963-64 AND PROJECTED REQUIREMENTS FOR 1973: Peru                                      | 111         |
| Table 2-10. NUMBER OF ACTIVE PHYSICIANS AND POPULATION-PHYSICIAN RATIOS: by Hypothesis: Peru, 1940, 1957, 1961, 1964, 1974 and 1984. | 120         |

| <b>Chapter 3. DENTISTS</b>  | <b>Page</b> |
|---|-------------|
| Table 3-1. PERCENTAGE OF DENTISTS REMAINING ACTIVE: by Sex and Decade of Licensure: Peru, 1964                      | 125         |
| Table 3-2. NUMBER OF ACTIVE DENTISTS AND POPULATION-DENTIST RATIOS: by Population Group: Peru, 1964                 | 127         |
| Table 3-3. DISTRIBUTION OF ACTIVE DENTISTS BY EMPLOYMENT CATEGORY: Peru, 1964                                       | 128         |
| Table 3-4. AVERAGE HOURS WORKED PER WEEK BY DENTISTS: by Employment Category: Peru, 1964                            | 129         |
| Table 3-5. DISTRIBUTION OF SALARIED DENTISTS AND AVERAGE HOURS WORKED PER WEEK: by Employer: Peru, 1964             | 130         |
| Table 3-6. TEACHING PERSONNEL AND FACULTY-STUDENT RATIOS: by School of Dentistry: Peru                              | 134         |
| Table 3-7. COST OF DENTAL EDUCATION: by Year and Faculty of Dentistry: Peru, 1961-1964                              | 135         |
| Table 3-8. PROJECTED ENTRANTS, ATTRITION RATE AND GRADUATES: Peruvian Schools of Dentistry: 1964-83                 | 136         |
| Table 3-9. SUPPLY OF ACTIVE DENTISTS: by Alternative Hypothesis of Retention: Peru, 1964, 1974 and 1984             | 137         |
| <b>Chapter 4. PHARMACISTS</b>   |             |
| Table 4-1. ESTIMATED PERCENTAGE OF PHARMACISTS REMAINING ACTIVE: by Sex and Decade of Licensure: Peru, 1964         | 142         |
| Table 4-2. ESTIMATED NUMBER OF ACTIVE PHARMACISTS AND POPULATION-PHARMACIST RATIOS: by Population Group: Peru, 1964 | 143         |
| Table 4-3. SCHOOL OF PHARMACY FACULTY AND PROFESSOR-STUDENT RATIOS: by School of Pharmacy: Peru, 1963-1964          | 148         |
| Table 4-4. SUPPLY OF ACTIVE PHARMACISTS: by Alternative Hypothesis of Retention: Peru, 1964, 1974 and 1984          | 151         |

| <b>Chapter 5. NURSES</b>  | <b>Page</b> |
|---|-------------|
| Table 5-1. NUMBER OF ACTIVE NURSES AND POPULATION-NURSE RATIOS: by Population Group: Peru, 1964                               | 155         |
| Table 5-2. DISTRIBUTION OF NURSES AND PERCENTAGE IN HOSPITAL SERVICE: by Employer: Peru, 1964                                 | 156         |
| Table 5-3. NUMBER OF HOSPITAL-BASED NURSES AND NURSE AUXILIARIES AVAILABLE PER TEN BEDS: by System of Health Care: Peru, 1964 | 157         |
| Table 5-4. PERCENTAGE OF NURSES REMAINING ACTIVE: by Decade of Licensure: Peru, 1964  | 158         |
| Table 5-5. OCCUPIED, VACANT, AND DESIRED TEACHING POSITIONS: Peruvian Schools of Nursing, 1964                                | 168         |
| Table 5-6. ASSUMPTIONS USED TO ESTIMATE THE COST OF SMALL AND LARGE NURSING SCHOOLS: Peru                                     | 172         |
| Table 5-7. OUTPUT OF PERUVIAN SCHOOLS OF NURSING; PLANNING ASSUMPTIONS USED: 1964-83  | 174         |
| Table 5-8. SUPPLY OF ACTIVE NURSES: by Alternative Hypothesis of Retention: Peru, 1951, 1964, 1974 and 1984                   | 175         |
| Table 5-9. DOCTOR-NURSE RATIOS: Peru, 1964, 1974 and 1984   | 176         |
| <b>Chapter 6. MIDWIVES</b>  |             |
| Table 6-1. PERCENTAGE OF MIDWIVES AND NURSES REMAINING ACTIVE: by Decade of Licensure: Peru, 1964                             | 180         |
| Table 6-2. NUMBER OF ACTIVE MIDWIVES AND POPULATION-MIDWIFE RATIOS: by Population Group: Peru, 1964                           | 181         |
| Table 6-3. DISTRIBUTION OF SALARIED MIDWIVES; AVERAGE HOURS WORKED PER WEEK; MIDWIVES PER 100 BEDS: by Employer: Peru, 1964   | 181         |
| Table 6-4. ESTIMATED AVERAGE MONTHLY INCOME FOR MIDWIVES: by Type of Work Situation: Peru, 1964                               | 183         |
| Table 6-5. TEACHING PERSONNEL AT MIDWIFERY SCHOOLS: Peru, 1963  | 187         |
| Table 6-6. SUPPLY OF ACTIVE MIDWIVES: by Alternative Hypothesis of Retention: Peru, 1964, 1974 and 1984                       | 193         |

|   | <u>Page</u> |
|---|-------------|
| <b>Chapter 7. THE SUPPLY OF OTHER CATEGORIES OF HEALTH PERSONNEL</b>  |             |
| Table 7-1. EDUCATIONAL ATTAINMENT AND WEEKS OF TRAINING OF LABORATORY PERSONNEL: Peru, 1964   | 200         |
| Table 7-2. COURSES FOR LABORATORY TECHNICIANS: Duration, Frequency, Educational Requirements and Enrollment: Peru, 1964             | 201         |
| Table 7-3. NUMBER OF AUXILIARY NURSING PERSONNEL; PERCENTAGE IN PUBLIC SECTOR; PERCENTAGE MALE: by Personnel Category: Peru, 1964   | 209         |
| Table 7-4. NUMBER OF AUXILIARY NURSING PERSONNEL PER PROFESSIONAL AND PER TEN HOSPITAL BEDS: BY Health Care System: Peru, 1964      | 210         |
| Table 7-5. EDUCATIONAL ATTAINMENT OF AUXILIARY NURSING PERSONNEL: by Personnel Category: Peru, 1964                                 | 210         |
| Table 7-6. WEEKS OF FORMAL TRAINING RECEIVED BY AUXILIARY NURSING PERSONNEL: by Personnel Category: Peru, 1964                      | 211         |
| <br>  |             |
| <b>Chapter 9. CURRENT DEMAND</b>  |             |
| Table 9-1. ESTIMATED PHYSICIAN VISITS AND HOSPITAL DISCHARGES PRODUCED: by Sector: Peru, 1964                                       | 232         |
| Table 9-2. SELECTED INDICES OF HOSPITAL BED PRODUCTIVITY: by Sector and Type of Hospital: Peru, 1964                                | 234         |
| Table 9-3. ESTIMATED UTILIZATION OF PHYSICIAN VISITS AND HOSPITAL CARE: Peru, Taiwan and Turkey                                     | 235         |
| Table 9-4. ESTIMATED PRODUCTIVITY AND UTILIZATION RATES FOR SELECTED NON-MEDICAL SERVICES: by Sector: Peru, 1964                    | 237         |
| Table 9-5. ESTIMATED DISTRIBUTION OF PHYSICIAN VISITS AND PERCENTAGE PROVIDED BY THE PUBLIC SECTOR: by Population Group: Peru, 1964 | 238         |
| Table 9-6. DISTRIBUTION OF HOSPITALS AND HOSPITAL BEDS; BEDS PER THOUSAND POPULATION: by Population Group: Peru, 1964               | 239         |

|  | <u>Page</u> |
|--|-------------|
| Table 9-7. DISTRIBUTION BY RESIDENCE OF PATIENTS HOSPITALIZED AT THE ANTONIO LORENO HOSPITAL: Cuzco, 1955 and 1963   | 239         |
| Table 9-8. NUMBER AND DISTRIBUTION OF AMBULATORY PATIENTS ATTENDED AT THE ANTONIO LORENO HOSPITAL: by Type of Service and Residence: Cuzco, 1963   | 240         |
| Table 9-9. ESTIMATED DEMAND FOR PHYSICIAN VISITS AND HOSPITAL CARE BY INSURED EMPLOYEES AND WORKERS AND AMERICAN ANALOGS   | 243         |
| Table 9-10. PUBLIC SECTOR HEALTH EXPENDITURES IN INDEX VALUES; PERCENTAGE FOR OPERATIONS; DISTRIBUTION OF TOTAL OPERATING EXPENDITURES BY SELECTED HEALTH CARE SYSTEMS: by Year: Peru, 1958-64 | 247         |
| Table 9-11. ESTIMATED COST OF THE HEALTH SECTOR, INCLUDING INVESTMENTS: by Expenditure Category: Peru, 1964  | 249         |
| Table 9-12. ESTIMATED NUMBER AND PERCENTAGE OF FULL-TIME EQUIVALENT PERSONNEL WORKING IN HEALTH; POPULATION PER WORKER: by Sector, Personnel Category, and Type of Activity: Peru, 1964        | 251         |
| Table 9-13. PERCENTAGE ATTAINMENT OF STAFFING STANDARDS FOR HOSPITAL-BASED PERSONNEL: by Personnel Category and System of Health Care: Peru, 1964  | 253b        |
| Table 9-14. NUMBER AND PERCENTAGE OF POSITIONS VACANT, AND ESTIMATED TOTAL VACANCIES: by Personnel Category: Peru, May-August, 1964  | 255         |
| <br>Chapter 10. FUTURE DEMAND  |             |
| Table 10-1. PROJECTED PRODUCTION AND UTILIZATION RATES FOR SELECTED HEALTH SERVICES: Peru, 1984  | 261         |
| Table 10-2. ASSUMED BED, PHYSICIAN AND DENTIST PRODUCTIVITY: by Sector: Peru, 1964 and 1984  | 269         |
| Table 10-3. PROJECTED DEMAND FOR HEALTH MANPOWER ACCORDING TO THE MODEL; PROJECTED SUPPLY OF SELECTED CATEGORIES OF PROFESSIONALS: Peru, 1984  | 270         |
| Table 10-4. ESTIMATED COST OF THE HEALTH SECTOR ACCORDING TO THE DEMAND MODEL: by Expenditure Category: Peru, 1984   | 272         |
| Table 10-5. ESTIMATED RESOURCE COSTS OR SAVINGS OF A ONE PERCENT CHANGE IN THE VOLUME OF SELECTED PUBLIC SECTOR SERVICES: Peru, 1964   | 278         |

|   | <u>Page</u> |
|---|-------------|
| Table 10-6. COMPARISON OF SELECTED CHARACTERISTICS OF THE TWO MODELS USED TO PROJECT MANPOWER DEMAND: Peru, 1984  | 280         |
| <br>Chapter 11. BRINGING SUPPLY AND DEMAND INTO BALANCE   |             |
| Table 11-1. PROJECTED PHYSICIAN SUPPLY AND DEMAND: by Hypothesis: Peru, 1974 and 1984   | 282         |
| Table 11-2. NUMBER OF SCHOOLS REQUIRED, COSTS, AND PERCENTAGE OF UNIVERSITY-TRAINED NURSES EMPLOYED: by Policy Alternative Adopted to Achieve a 1:1 Physician-Nurse Ratio in 1994: Peru | 302         |
| Table 11-3. RATE OF LABORATORY TECHNICIAN TRAINING ADEQUATE TO SATISFY THE 1984 PROJECTED DEMAND (MODERATE GROWTH MODEL): by Length of Training: Peru                                   | 318         |
| Table 11-4. APPROXIMATE RATE OF AUXILIARY TRAINING REQUIRED TO MEET 1984 PUBLIC SECTOR REQUIREMENTS: by Demand Projection: Peru, 1964-84  | 321         |
| <br>Chapter 12. ISSUES IN HEALTH MANPOWER PLANNING  |             |
| Table 12-1. PERSONS PER HEALTH PROFESSIONAL: by Population Group: Peru, 1964  | 335         |
| Table 12-2. COMMUNITIES UNDER 10,000 POPULATION: Estimated Number, Population, and Number with Medical and Non-medical Facilities: by Community Size: Peru, 1964                        | 338         |

## LIST OF APPENDIX TABLES

Page

## SUPPLEMENTARY TABLES

|  |     |
|--|-----|
| ESTIMATED MID-YEAR POPULATION: by Year: Peru, 1925-1984  | 369 |
| DISTRICTS INCLUDED WITHIN EACH POPULATION GROUP  | 370 |
| INFORMATION OBTAINED IN THE CENSUS OF PROFESSIONAL AND<br>NON-PROFESSIONAL HEALTH PERSONNEL (Shortened Forms)                        | 371 |
| NUMBER OF DOCTORS, DENTISTS, PHARMACISTS, NURSES AND<br>MIDWIVES LICENSED: by Year: Peru, 1914-1963                                  | 372 |
| PROFESSIONALLY ACTIVE DOCTORS, DENTISTS, PHARMACISTS,<br>NURSES AND MIDWIVES; PERSONS PER PROFESSIONAL: by<br>Department: Peru, 1964 | 373 |

## METHODOLOGY

|   |     |
|---|-----|
| PHYSICIAN INCOME ESTIMATES  | 374 |
| METHOD OF ESTIMATING THE NUMBER OF FOREIGN MEDICAL DEGREE<br>VALIDATIONS                                    | 380 |
| MIDWIFE INCOME ESTIMATES  | 383 |
| VOLUME AND PRODUCTIVITY ESTIMATES FOR PHYSICIAN VISITS<br>AND HOSPITAL DISCHARGES                           | 385 |
| ASSUMPTIONS USED TO ESTIMATE DEMAND BY INSURED PERUVIAN<br>WORKERS AND EMPLOYEES AND THEIR AMERICAN ANALOGS | 387 |
| ASSUMPTIONS AND METHODS USED TO ESTIMATE THE COST OF THE<br>HEALTH SECTOR IN 1964                           | 390 |
| STANDARDS AND ASSUMPTIONS USED TO ESTIMATE THE DEMAND FOR<br>HEALTH MANPOWER                                | 392 |
| COST PROJECTIONS OF THE DEMAND MODEL  | 396 |

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