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HEALTH MANPOWER 1966-75, A STUDY OF REQUIREMENTS AND SUPPLY.
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DESCRIPTORS- *HEALTH OCCUPATIONS, *MANPOWER NEEDS, EMPLOYMENT STATISTICS, EDUCATIONAL PROGRAMS, *EMPLOYMENT PROJECTIONS, EMPLOYMENT OPPORTUNITIES, LABOR MARKET,

POPULATION GROWTH, INCREASING ABILITY OF INDIVIDUALS TO PAY FOR HEALTH CARE, AND THE GROWING ABILITY OF HEALTH PROFESSIONS TO PROVIDE MORE AND BETTER SERVICES ARE BASIC TO THE FOLLOWING PROJECTIONS OF INCREASED NEED--(1) HEALTH PERSONNEL WITHIN THE HEALTH INDUSTRY, FROM 3.7 TO 5.35 MILLION, AND OUTSIDE THE INDUSTRY, FROM 400,000 TO 500,000, (2) PHYSICIANS, FROM MORE THAN 290,000 TO 390,000, (3) DENTISTS, FROM 97,500 TO 125,000, (4) OPTOMETRISTS, FROM 17,000 TO 20,000, (5) PODIATRISTS, FROM 8,000 TO 9,600, (6) REGISTERED NURSES, FROM 620,000 TO 860,000, (7) LICENSED PRACTICAL NURSES, FROM 300,000 TO 465,000, (8) AIDS, ORDERLIES, AND ATTENDANTS, FROM 700,000 TO NEARLY 1.1 MILLION, (9) OCCUPATIONAL THERAPISTS, FROM 6,500 TO 16,500, (10) PHYSICAL THERAPISTS, FROM 12,500 TO 27,000, (11) MEDICAL TECHNOLOGISTS, FROM 40,000 TO 75,000, (12) MEDICAL LABORATORY ASSISTANTS, FROM 50,000 TO 100,000, (13) PHARAMACISTS, FROM 120,000 TO 126,000, (14) DIETICIANS, FROM 30,000 TO NEARLY 38,000, (15) X-RAY TECHNICIANS FROM 72,000 TO 100,000, AND (16) MEDICAL RECORD LIBRARIANS, FROM 12,000 TO 18,000. THE PERCENT INCREASE IN 1966 TRAINING WHICH WILL BE REQUIRED TO MEET 1975 NEEDS RANGES FROM 15 PERCENT FOR PHARMACISTS TO 165 PERCENT FOR PODIATRISTS AND OCCUPATIONAL THERAPISTS. CONGRESS HAS TAKEN ACTION TO MEET THE GROWING NEED FOR HEALTH WORKERS THROUGH RECENT LEGISLATION, BUT ADDITIONAL ACTION IS NECESSARY. EMPLOYMENT INFORMATION FOR EACH HEALTH OCCUPATION AND A SELECTED BIBLIOGRAPHY RELATING TO HEALTH MANPOWER ARE INCLUDED. (JK)

health manpower 1966-75 a study of requirements and supply

Report No. 323
June 1967

UNITED STATES DEPARTMENT OF LABOR
Willard Wirtz, Secretary
BUREAU OF LABOR STATISTICS
Arthur M. Ross, Commissioner

FOREWORD

On May 7, 1966, the President's Committee on Health Manpower was established by Executive Order 11297. The duties of the committee are threefold: (1) Appraise the current and prospective national requirements for and supply of health manpower to meet the needs of the civilian population and the Armed Forces; (2) evaluate existing and alternative policies, programs, and practices of public agencies and private institutions and organizations for increasing health manpower; and (3) develop appropriate recommendations for action by Government or by private institutions, organizations, or individuals for improving the availability and utilization of health manpower. The Secretary of Labor was named a member of the committee.

Recognizing that much of the work conducted within the Department of Labor is related to the tasks of the President's Committee on Health Manpower, the Secretary of Labor established a Department of Labor Committee on Health Manpower to coordinate the Department's health manpower activities. This intradepartmental committee asked the Bureau of Labor Statistics to prepare a report on the current and prospective supply and demand for health manpower, utilizing the research being done in its occupational outlook program. The report presented here is in response to that request. The report presents a comprehensive discussion of future requirements and supply of health manpower and can be used by government officials and others as an aid in planning education and training programs and in assessing the effect of recent Federal legislation designed to encourage the training of health workers. It also can be used in vocational guidance as a source of information on employment opportunities. Information on health occupations specifically designed for use in vocational guidance is provided by the Bureau of Labor Statistics in the Occupational Outlook Handbook.

In using the projections that appear on this study, several points should be kept in mind. Among the most important of these is that the projections are based on a set of assumptions describing the nature and composition of the economy in 1975. (See page 8.) Use of other assumptions would result in different estimates. The effects of using alternative assumptions are illustrated in the report.

Another point to be kept in mind is that the projections of requirements were developed without taking into account limitations in the future supply of personnel. Thus, the requirement projections represent the Nation's effective demand for workers in 1975 under stated assumptions; they are not predictions of what employment actually will be in that year. Furthermore, they are not estimates of manpower needs to provide a specific standard of medical care.

Many factors, such as advances in medical science and new Federal legislation, are continuously producing changes that have a major affect on the demand for health manpower. The projections are an attempt to quantify the effect of all the known factors. As with all manpower projections, however, they necessarily required the use of considerable judgment. In cases where no patterns of change seemed clear, the assumption was made that recent trends would continue. Because judgments change as new data and knowledge become available, these projections will be reviewed and revised from time to time.

The report was prepared in the Bureau of Labor Statistics Division of Manpower and Occupational Outlook under the direction Sol Swerdloff, Chief. The report was prepared by Neal H. Rosenthal with the assistance of Annie Lefkowitz and Michael Pilot.

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SUMMARY

The demand for health services is expected to increase very rapidly over the next decade, primarily because of the growth in population, the increasing ability of individuals to pay for health care, and the growing ability of the medical professions to provide more and better services. As a result, employment requirements in hospitals, nursing homes, physicians' offices, and other establishments in the health industry are expected to increase from 3.7 million to 5.35 million between 1966 and 1975--an increase of about 45 percent. This represents an annual rate of increase similar to that of the 1960-66 period when employment increased from 2.8 million to 3.7 million, or by nearly one-third. In addition to the need for 1.65 million workers to staff new positions, about 1.0 million workers will be needed to replace workers who are expected to die, retire, or leave the labor force for other reasons over the 1966-75 period.[1/]

Manpower requirements for workers in health occupations employed outside of the health industry--including those for nurses in manufacturing firms, pharmacists in retail drug stores, and medical scientists in research laboratories--are expected to increase by about 100,000 from about 400,000 in 1966 to 500,000 in 1975. Net replacement needs resulting from deaths, retirements, and other separations from the labor force are estimated at about 100,000 over the 9-year period.

Employment requirements in individual occupations are expected to show markedly different rates of growth over the 1966-75 period. The demand for physicians is expected to grow from more than 295,000 to about 390,000, or about one-third; and for dentists, from about 97,500 to 125,000, or by more than one-fourth. In addition, about 50,000 physicians and 17,500 dentists will be needed to replace those who die or leave the labor force for other reasons. Requirements for optometrists are expected to grow by about 3,000 (from 17,000 to about 20,000), and about the same number will be needed for replacements. Manpower needs for podiatrists are estimated to be 1,600 for growth (from 8,000 to 9,600) and 1,300 for replacements.

In the nursing occupations, a very rapid increase in employment requirements is anticipated through the mid-1970's. The need for registered nurses is expected to grow by 240,000, from 620,000 to 860,000, despite the trend toward the greater utilization of licensed practical nurses and nurse aids, orderlies, and attendants relative to registered nurses. In addition to these growth requirements, about 150,000 registered nurses will be needed between 1966 and 1975 to replace those who will die or leave the labor force for other reasons. The demand for licensed practical nurses is expected to increase from 300,000 to 465,000, and for aids, orderlies, and attendants from about 700,000 to nearly 1.1 million. Net replacement needs are estimated at 125,000 for licensed practical nurses, and at more than 300,000 for aids, orderlies, and attendants.

The demand for occupational therapists and for physical therapists is expected to increase much faster than in most other health occupations, rising from 6,500 to 16,500 and from 12,500 to 27,000 respectively, because of increasing emphasis on therapeutic programs. Replacement

[1]These are net replacement losses. They include gross separations from the labor force minus qualified workers returning to the labor force.

needs are estimated at about 3,000 for occupational therapists and 5,000 for physical therapists over the 9-year period. The need for medical technologists is expected to increase by nearly 90 percent, from 40,000 to about 75,000, and medical laboratory assistants by 100 percent, from about 50,000 to approximately 100,000. Net replacement needs for these workers are estimated at about 15,000 and 20,000, respectively.

The growth of employment requirements for pharmacists will be relatively small, from 120,000 to 126,000. This small increase reflects the continuing trend toward preparation of drugs by manufacturers, replacement of small drugstores by large establishments, and greater use of pharmacist's assistants. The greatest need for pharmacists will result from replacement of those who leave the labor force--an estimated 32,000 over the 1966-75 period. Employment requirements for dietitians are expected to increase from 30,000 to nearly 38,000. Net replacement needs for these workers between 1966 and 1975 are estimated at 9,000. The demand for medical X-ray technicians is expected to increase from 72,000 to 100,000, and for medical record librarians from 12,000 to 18,000. Net replacement needs are estimated at 23,000 and 4,000, respectively, in these occupations.

Training Must be Expanded

Thousands of workers complete specialized health manpower training programs each year. Although most of these graduates enter the field for which they were trained, some enter other occupations or choose not to work at all. In addition to those entering health occupations directly after completing a specialized training program, many immigrants and persons employed in other occupations enter health occupations, as do persons outside the labor force; many have previous experience.

How adequate is the current number of graduates in specialized health occupations? In all occupations studied in this report, training must be expanded significantly to meet future needs. The tabulation below shows the percent that current (1966) output of graduates must be increased if the projected 1966-75 requirements for growth and replacement are to be met. (These calculations assume that recent patterns of entry to the health fields from sources other than new graduates will continue.)

Occupation	Percent increase in current (1966) training required to meet estimated 1975 manpower needs
Medical "practitioners":	
Physicians	80
Dentists	55
Optometrists	75
Podiatrists	165
Nursing:	
Registered nurses	25
Licensed practical nurses	30
Other professional and technical:	
Medical technologists	60
Pharmacists	15
Occupational therapists	165
Physical therapists	130

To expand the output of training programs for health workers, actions are needed both to increase the capacity of schools (as in the case of medical schools which are presently filled to capacity) and to attract additional students (as in the case of professional nursing schools which have openings). Congress has taken action to meet the growing need for health workers through recent legislation, including the Health Professions Educational Assistance Act of 1963, the Nurse Training Act of 1964, the Allied Health Professions Personnel Training Act of 1966, and the Manpower Development and Training Act of 1962. As of March 1967, projects were approved and funded under the Health Professions Educational Assistance Act of 1963 for the construction of schools that would increase the enrollment capacity by about 1,200 in medical schools and 600 in dental schools. Under the Manpower Development and Training Act of 1962, about 63,000 trainees were enrolled in various occupational training programs in health fields from August 1962 through December 1966. Despite these activities, if future health manpower requirements are to be met, additional action is necessary to increase the number of graduates of health worker training programs in all health occupations analyzed in this report.

INTRODUCTION

Health manpower traditionally has been analyzed from two different vantage points. The first includes all workers employed in hospitals, nursing homes, offices of physicians, and other establishments in the medical and health services industry.[2] Under this type of analysis, secretaries, bookkeepers, janitors, and other workers not trained specifically to provide health services would be included as well as those in health occupations (e.g., physician, nurse, orderly).

The second way of examining health manpower is from an occupational viewpoint. In this type of analysis, only workers who are employed in a health occupation are included, regardless of the industry in which they are employed.[3] For example, nurses employed in health units of manufacturing firms and pharmacists in retail drug stores would be included in this type of analysis, as well as those employed in hospitals and nursing homes.

The distribution of workers engaged in providing health services in 1966, by occupation and by industry, is illustrated in chart 1.

The first part of the report focuses on the medical and health services industry. It includes a discussion of 1966 employment and shortages and projected 1975 manpower requirements. The second part of the study is about health occupations, and also presents information on 1966 employment and shortages and projected 1975 manpower requirements. In addition, it includes a discussion of the projected supply of health workers, an analysis of supply and demand, and recommendations on how supply can be expanded to meet projected needs. (Non-health occupations in the medical and health services industry are not discussed separately; they are only a small part of the Nation's total employment in those occupations, and their training is not significantly different from their training in other industries.) Following the body of the report are several appendixes, including statistical tables, a discussion of the methodology used to develop the projections, and a selective bibliography of health manpower studies.

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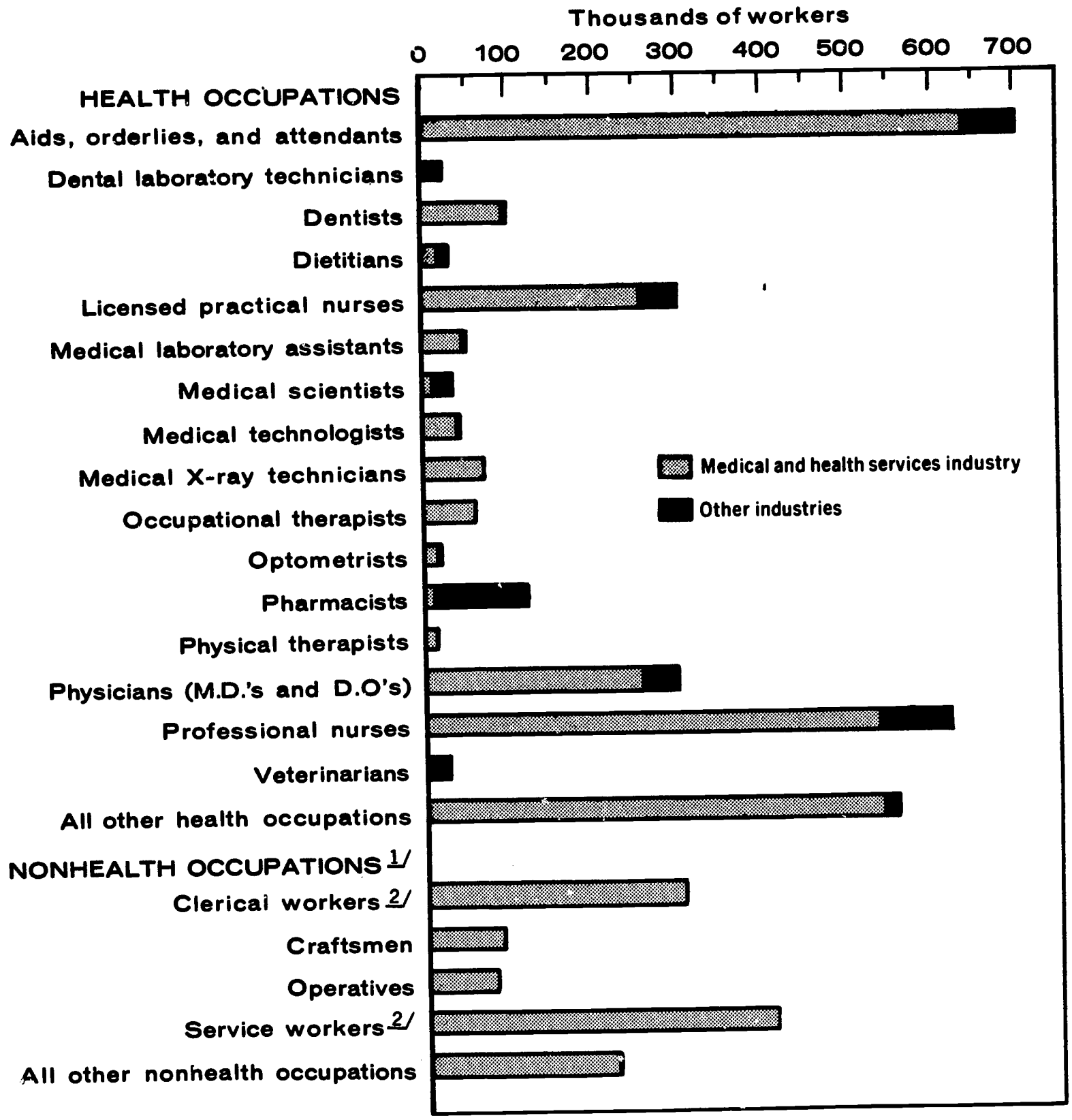
[2] Medical and health services industry employment in this report includes private and public wage and salary workers, unpaid family workers, and self-employed persons in medical and other health services establishments (SIC 80, 9180, 9280, and 9380) as defined by the Standard Industrial Classification Manual, 1967.

[3] Health occupations may be described as those that are fundamental or unique to the provision of health services, i.e., physician, professional nurse, hospital attendant.

Chart 1. Health Manpower in the Medical and Health Services Industry and in Other Industries, by Selected Occupation, 1966



1/ For nonhealth occupations, only those employed in the medical and health services industry are shown on the chart.

2/ Totals exclude workers in these major occupation groups who are included above under health occupations.

PART I. THE MEDICAL AND HEALTH SERVICES INDUSTRY

Employment in 1966

About 3.7 million workers were employed in the medical and health services industry in 1966, nearly one-third more than the 2.8 million employed in 1960. Nearly two-thirds of the workers in the health industry in 1966 were employed in hospitals. The remainder were employed in nursing homes, sanitariums, medical and dental laboratories, offices of physicians or other medical practitioners, or were self-employed.

About two-fifths of all workers in the industry, or about 1.5 million in 1966, were professional, technical, and kindred workers--about one-fourth more than the 1.2 million employed in 1960. Professional nurses, numbering about 585,000, were the largest professional occupation. Other professional occupations employing large numbers include physician,[4] 255,000; medical and dental technician, 205,000; and dentist, 95,000. The remaining professional workers were employed in a variety of occupations. (See appendix table A-1.)

Service workers constitute more than one-third of all employees in the medical and health services industry; about 1.3 million were employed in 1966. Between 1960 and 1966, employment increased from 940,000 to 1.3 million, or by two-fifths. About half of all service workers were nurse aids, orderlies, and attendants in 1966. Another large service occupation was practical nurse, comprising nearly 255,000 workers.[5] Smaller numbers of service workers were employed as cooks (50,000) and as cleaners and janitors (about 80,000). The remaining service workers, about 290,000 were employed in a variety of occupations, including guards, barbers, waiters and waitresses, and kitchen workers.

Approximately 600,000 clerical and kindred workers were employed in the medical and health services industry in 1966--about 16 percent of the total. Clerical worker employment increased from 440,000 to 600,000 between 1960 and 1966, or by about 36 percent. One-third of all clerical workers were stenographers, typists, and secretaries in 1966. The remainder were employed as bookkeepers, accounting clerks, office machine operators, receptionists, and in a variety of other clerical occupations.

The remaining major occupational groups--managers, sales workers, craftsmen, operatives, and laborers--each employed only a small proportion of the workers in the industry. Among the individual occupations in these groups, the largest was laundry and drycleaning operator in the operative group, accounting for about 45,000 employed in 1966.

The occupational distribution in hospitals differs significantly from that in other medical and health services industry segments combined. There was a much higher proportion of service workers in hospitals than in "other health service establishments" (43 percent to 22 percent), primarily reflecting the large numbers of nurse aids, orderlies, and attendants in these institutions. On the other hand, the proportion of professional and technical workers was much lower in hospitals (36 percent to 48 percent). Most medical practitioners, including physicians, dentists, and optometrists, are self-employed and thus, are included in the "other medical and health services" rather than in hospitals. The proportion of clerical workers was higher in "other medical and health service establishments" than in hospitals (24 percent to

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[4] Includes Doctors of Medicine (M.D.'s) and Doctors of Osteopathy (D.O.'s).

[5] Practical nurses are classified as service workers in the census reports which provided the basis for the classification of workers in this report. It should be noted, however, that the 3d edition of the Dictionary of Occupational Titles classifies practical nurse as a professional occupation.

12 percent), partly because of the large number of receptionists and office attendants employed in doctors' and dentists' offices.

Current Needs

Shortages of health personnel have been reported for several years. Opinions have differed, however, on methods of measuring the magnitude of these shortages. Realizing the great need for reliable data on shortages on a national basis, the Public Health Service and the American Hospital Association conducted a 1966 survey of staffing needs in all AHA registered hospitals. The survey collected information on most urgent staffing needs--the five occupations having unfilled staffing requirements most urgently in need of being filled. Similar information for nursing homes and other extended care facilities was obtained in a 1966 survey conducted by the Public Health Service. Both surveys excluded physicians and other medical pratitioners.

More than three-fourths of all urgent needs were for nursing personnel--registered nurses, 62,000; aids, orderlies, and attendants, 29,000; and practical nurses, 22,000. Other occupations in which urgent needs were significant included medical technologists, dietitians, occupational therapists, physical therapists, and social workers. (See table 1.) Smaller needs were reported for laboratory assistants, medical record personnel, surgical technicians, and pharmacists. Some urgent needs also were reported in nonhealth occupations, including food service, maintenance, and clerical jobs, although needs in these occupations amounted to only a small percent of each occupation's total employment.

Projected Manpower Needs, 1975

Among the most significant factors that underlie any manpower projection, are the basic assumptions describing the nature and composition of the economy in the target year. In developing the occupational projections presented here, the basic assumptions were (1) a gross national product (GNP) in 1975 of about $1.058 trillion (in 1965 dollars); and (2) a resolution of the Vietnam conflict by 1970, and an international situation prevailing similar to the year or two immediately prior to the Vietnam buildup. Other major assumptions are that the economic and social patterns in our society, including patterns of consumption, will continue to change at about the same rate as they have in the recent past, and that the rate of scientific and technological advances of recent years will continue. Other more specific assumptions underlying the demand for health manpower are discussed later in the report where they specifically apply.

Many factors affect the demand for health manpower. The two most important are the number of persons requiring health care and the amount of funds spent on health care, from public as well as private sources. The first factor is a direct function of population and its age and sex composition. The second factor is influenced in large part by income levels and consumer expenditure patterns, the way in which health care is financed, and government policy. In developing the projections of health manpower in 1975, these factors were analyzed as were other factors affecting the need for health manpower, including anticipated technological change, occupational utilization patterns, and the need to eliminate current shortages.

Population. The population projections of the United States used in this report indicate an increase of about 13.7 percent between 1966 and 1975, a somewhat slower rate of growth than in the recent past. The number of persons over 65 and persons under 5 are those who have the greatest need of medical care and are projected to increase faster than the population as a whole.[6]/ The growth in the number of persons

[6]Series B developed by the Bureau of the Census. (See Projections of the Population of the United States by Age, Sex, and Color to 1990, with Extensions of Total Population to 2015, "Current Population Reports," Series P-25, No. 359, Bureau of the Census, February 20, 1967.)

Table 1. Most Urgent Staffing Needs in Hospitals and Extended Care Facilities, 1/ 1966

Occupation	Total	Hospitals	Extended care facilities
Total, all personnel	144,600	120,300	24,300
Medical and professional	131,100	108,600	22,500
Registered nurses	62,000	56,900	5,100
Licensed practical nurses	21,800	14,100	7,700
Aids, orderlies, attendants	29,000	21,800	7,200
Medical technologists	4,100	4,100	---
Dietitians	2,100	1,600	500
Occupational therapists	1,600	1,200	400
Physical therapists	1,500	800	700
Social workers	2,200	2,000	200
Laboratory assistants	800	800	---
Other	6,000	5,300	700
Other personnel	13,500	11,700	1,800
Food service	3,500	2,600	900
Housekeeping	3,200	2,800	400
Maintenance	3,100	2,800	300
Clerical	2,900	2,900	---
Other	800	600	200

1/ Includes nursing homes, sanitariums, convalescent homes, and other institutions providing long-term health care.

Source: Based on preliminary data from a 1966 survey conducted by the Public Health Service and The American Hospital Association of all AHA registered hospitals and of a 1966 survey of extended care facilities conducted by the Public Health Service. Both surveys excluded physicians and other medical practictioners.

Table 2. Average Number of Physicians' Visits Per Person Per Year, By Age, July 1958 to June 1959 and July 1963 to June 1964

Age group	July 1963-June 1964	July 1958-June 1959
All persons	4.5	4.7
Under 5 years	5.5	6.0
5-14 years	2.8	3.4
15-24 years	4.3	4.0
25-44 years	4.5	4.7
45-64 years	5.0	5.1
65 years and over	6.7	6.7

Source: Volume of Physicians Visits, U.S. Department of Health, Education, and Welfare, Public Health Service, Vital and Health Statistics, Series 10, No. 18, June 1965.

over 65 and under 5 is particularly significant because physicians' visits per person per year for persons 65 and over are nearly one and one-half times as great as the average for the population as a whole and for persons under 5 about one and one-fifth times as large, according to the National Health Survey. (See table 2.)

Health Expenditures. Health expenditures (in 1965 dollars) have increased rapidly in the past, growing from less than $25 billion in 1955 to about $41 billion in 1965, an increase of nearly two-thirds. By 1975, health expenditures may increase by two-thirds to nearly $68 billion.[7] This assumes that the GNP will increase from $681 billion to about $1.058 trillion between 1965 and 1975 (see p. 8), and that the 1955-65 relationship between health expenditures and GNP will continue.

Part of the rise in health expenditures will result from the extension of coverage under health insurance plans. Although a large proportion of persons are covered by private health insurance, coverage under these plans is expected to increase even further. In addition, it is estimated that as a result of Medicare, an additional 10 million persons were covered by health insurance in 1966--about 5 percent of the population--and it is expected that this legislation will result in even greater coverage in the future. Other recent Federal legislation that should result in an increased need for health manpower includes Medicaid[8], which provides funds for medical care of the poor. The Mental Retardation Facilities and Community Mental Health Construction Act of 1962, which calls for the establishment of community health centers, also will increase the need for health manpower.

[7] In current dollars, the growth of health expenditures between 1955 and 1965 would be 125 percent, from $18 billion to $41 billion. If the cost of medical services continues to rise between 1966 and 1975 as in the past 10 years (about 3 percent a year), estimated health expenditures in 1975 in current dollars would be about $93 billion.

[8] Medicaid, which was established under Title XIX of the 1965 amendments to the Social Security Act, provides health benefits similar to the Medicare provisions. These benefits are available to families having dependent children and aged, blind, or permanently disabled people whose income and resources cannot meet medical costs.

Technological Developments.[9] Technological developments increasingly are becoming a major factor affecting the demand for health workers. Some technological developments will result in increased employment requirements in the medical and health services industry. The development of complex electronic devices, such as electronic flowmeters that regulate the flow of human blood during heart-lung operations, physiological monitoring equipment, and electronic microscopes, as well as other complex laboratory equipment, will increase the need for workers to operate these machines. The increasing use of new and improved surgical techniques, such as transplanting organs and performing surgery by laser beams, also will result in a need for additional health workers.

Some technological developments, on the other hand, will tend to limit the growth of manpower requirements in the health industry. For example, the growing use of disposable plastic and paper surgical gloves, caps, masks, hypodermic needles, and other items is expected to reduce the need for workers who perform laundry and sterilization duties in hospitals. Also, new hospitals increasingly will use laborsaving innovations such as new tray-assembly lines for preparing and serving food, thus reducing the need for kitchen workers. Furthermore, the increasing use of data processing equipment will reduce the need for such clerical workers as bookkeepers, business machine operators, and cashiers.

Growth in Requirements. Reflecting the anticipated rise in health expenditures and population, changing technology, the elimination of shortages, and other factors, manpower requirements in the medical and health services industry are expected to increase 45 percent between 1966 and 1975, from 3.7 million to about 5.35 million, or by 1.65 million. This represents an annual rate of increase similar to that of the recent past. Since some occupations are expected to grow faster than others, the occupational structure of the industry will change significantly over the period. In general, growth will be fastest in those occupations in which workers assist or supplement professional workers, including nurse aids, orderlies, and attendants; licensed practical nurses; and some technician occupations.

The number of professional and technical workers is expected to grow from 1.5 million to 2.1 million between 1966 and 1975, or by about two-fifths. (See appendix table A-2.) This represents an annual rate of growth similar to that of the recent past. The rate of growth will be faster in hospitals (42 percent) than in "other" medical and health services establishments (37 percent).

Service worker employment in the medical and health services industry is expected to grow very rapidly from about 1.3 million to nearly 2.0 million, or by about one-half. (This represents a slower annual rate of increase than in the recent past.) The very rapid growth of this occupational group is attributed to the sharp rise in demand for licensed practical nurses and nurse aids, orderlies, and attendants, who, by 1975, will represent about seven-tenths of all service workers in the industry. The rising need for these workers will result from increasing efforts of hospitals and nursing homes to utilize them in order to free registered nurses for higher level tasks.

The demand for clerical workers in the medical and health services industry also will increase very rapidly between 1966 and 1975, rising from about 600,000 to more than 900,000, or by about one-half. This represents a slightly slower annual rate of increase than in the 1960-66 period. More clerical workers will be needed to handle the expanding volume of paperwork that will result from the larger number of patients. Furthermore, physicians and other

[9] More detailed information on technological developments in the health industry is presented in Technology and Manpower in the Health Service Industry, 1965-1975, U.S. Department of Labor, Office of Manpower Policy, Evaluation, and Research, 1967.

medical practitioners will continue to use more clerical workers in an effort to free nursing staff and others in health occupations for work more directly related to patient care. The growing need for clerical services, however, is expected to be offset somewhat by the increasing use of data processing equipment. The employment of secretaries, stenographers, and typists, who will not be affected significantly by technological developments, will grow very rapidly, from 195,000 to nearly 300,000, or by one-half over the 9-year period.

Employment requirements for managerial workers (managers, officials, and proprietors) in the medical and health services industry will increase from nearly 95,000 to nearly 145,000 between 1966 and 1975, or by 52 percent, a rate of growth slightly faster than that expected for the industry as a whole. More managerial workers will be needed as hospitals, nursing homes, and other medical establishments grow in size and complexity.

The rate of growth in employment requirements for craftsmen (nearly two-fifths) and operatives (about one-fifth) is expected to be slower than average for the industry as a whole. Employment of sales workers and laborers, two very small groups, is expected to decline between 1966 and 1975.

Replacement Needs

In determining future manpower needs of the medical and health services industry, openings which result from deaths, retirements, and other separations from the labor force and from transfers to other industries also must be considered. Data on which to base estimates of such replacement losses, however, are very limited. Furthermore, it must be remembered that many health workers who have left the labor force for family responsibilities or other reasons return to work at a later period.

Losses to an industry's work force because of deaths, retirements, and other separations from the labor force are determined primarily by the size of the work force and the age and sex distribution of the workers. For example, replacement needs for women workers are very high, since many leave the labor force each year to get married and raise families. This fact is especially significant in the medical and health services industry, 80 percent of whose work force are women (compared with 34 percent in all industries). It is estimated that a total of approximately 1.5 million workers in the health industry will leave the labor force between 1966 and 1975. However, about 500,000 persons, mostly women, are expected to return to the labor force during this period. Thus, net replacement needs because of deaths, retirements, and other separations from the labor force over the 1966-75 period are estimated at 1.0 million.

Information on the movement of workers from the medical and health services industry to other industries is almost completely lacking. However, it may be assumed that since the bulk of these workers are in health related occupations, and thus are not utilized to any great extent in other industries, transfer losses to other industries would be relatively small. Furthermore, workers transferring into the health industry from other industries may offset most, if not all, of these losses. It has been assumed, therefore, that transfers out of the health industry will be offset by transfers in from other industries, resulting in no net loss or gain.

Alternative Assumptions

As indicated above, perhaps the most important factors underlying any manpower projection are the assumptions used. Therefore, it is useful to develop projections under several combinations of assumptions.[10] In this report,

[10] The assumptions presented earlier are called the "judgment" assumptions and underlie the resulting judgment projections. They are distinguished from the alternative "high" and "low" assumptions and projections presented here.

alternative projections were developed, using different sets of assumptions for the two major factors affecting the need for health manpower --population and health care expenditures.

The use of different assumptions about population in 1975 has little effect on estimates of 1975 requirements for health manpower. For example, Bureau of the Census series A and C population projections developed using different birth rate assumptions result in only a 2.0 percent difference in the total population estimates from the series B projections used in the judgment assumptions.[11]

On the other hand, different assumptions about the level of health care expenditures over the 1965-75 period would have a great impact on the need for health manpower. During the 1955-65 period, health expenditures grew at a faster rate than GNP, increasing from 4.5 to nearly 6.0 percent of GNP. In the basic projection model, it was assumed that the trend in the relationship between health expenditures and GNP would continue over the 1965-75 period.

The rate of increase of health expenditures relative to GNP was more rapid, however, in the 1955-60 period than in the 1960-65 period. (See chart 2.) Under the assumption that health expenditures, as a proportion of GNP, would increase in line with the experience of the 1955-65 period but not in line with the slower trend of the mid-1960's, health expenditures would rise about 6 percent above the levels indicated in the judgment projection model. If the increases in manpower were roughly proportionate to the rise in expenditures,[12] this would mean a need in 1975 for about 6 percent more workers than in the judgment projection, or about 5.7 million workers. Growth requirements between 1966 and 1975 under this alternative "high" model would be nearly 2.0 million compared with about 1.65 million in the judgment model.

Under the assumption that health expenditures would grow only at the same rate as GNP between 1965 and 1975, health expenditures in 1975 would be about 8 percent below the judgment projection level. Again assuming a proportionate increase in manpower as in expenditures,[13] employment requirements in 1975 would be about 8 percent below the judgment projection level, or about 4.9 million workers. Growth requirements under this illustrative low model would be more than 1.2 million compared with 1.65 million in the "judgment" model.

The factors which would bring about changes in the rate of growth of health expenditures from those assumed in the judgment model include great changes in the income distribution of families or in government policies related to health care. For example, if the number of families having incomes under $3,000 a year were to decrease to a lower proportion of the population than indicated by current patterns, total health care expenditures would be much higher, since higher income families spend proportionately more on health care than do lower income families.

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[11] See "Current Population Reports," Series P-25, No. 359, op. cit. Series D, which reflects the low birth rate during the early 1940's, has a slightly greater difference, 4.0 percent.

[12] Expenditures per employee in 1975 implied in the "judgment" projection were used in this analysis.

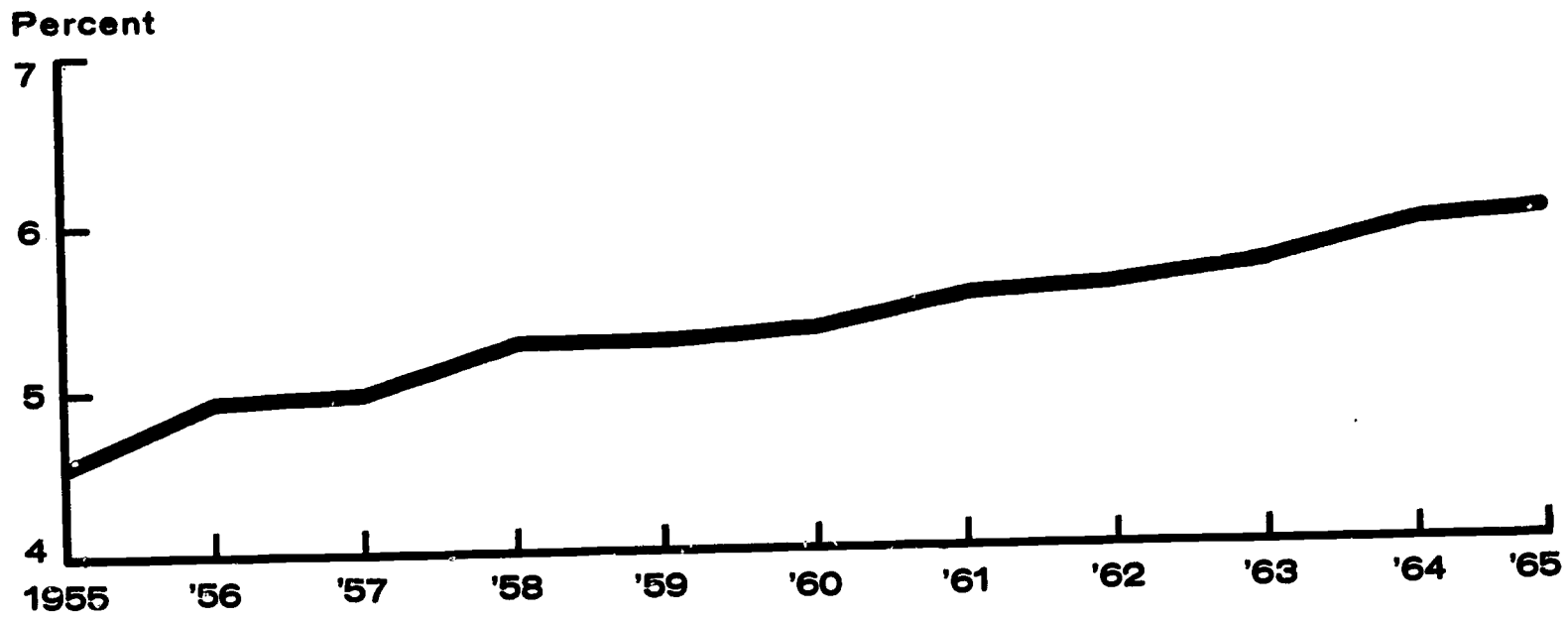
[13] As in the "high" illustration, expenditures per employee in 1975 used here was similar to that implied in the "judgment" projection.

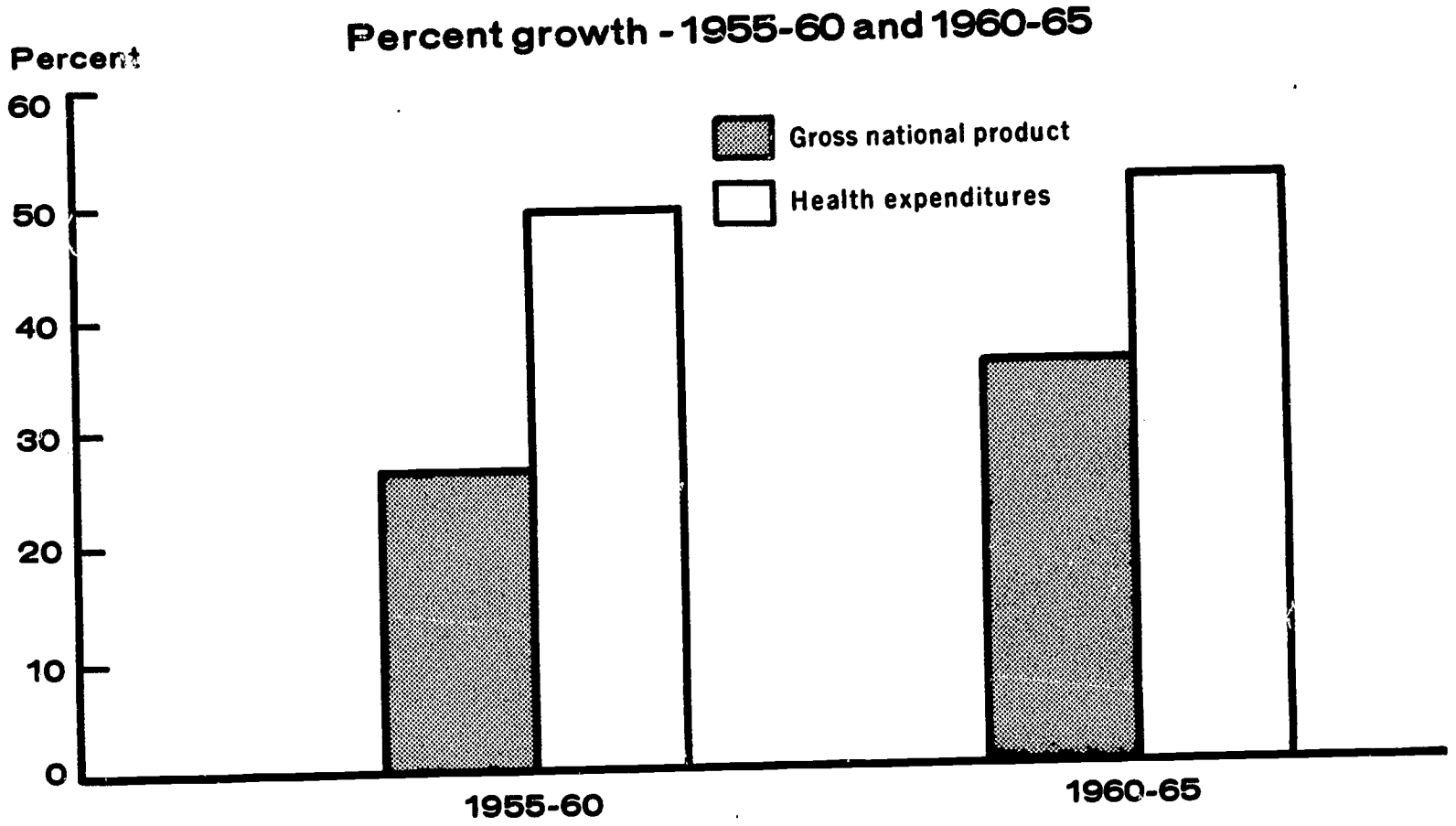
Table 3. Projected 1975 Employment Requirements in the Medical and Health Services Industry Under Illustrative "High," "Judgment," and "Low" Projections

(Millions of workers)

Level of demand	Projected 1975 employment requirements	Estimated growth of employment requirements 1966-1975
High.....	5.70	2.00
Judgment.....	5.35	1.65
Low	4.90	1.20

Chart 2. Comparison of National Health Expenditures and Gross National Product, 1955-65





Source: Based on information in "National Health Expenditures, 1950-65," Social Security Bulletin, February 1967, and "Social Welfare Expenditures, 1965-66," Social Security Bulletin, December 1966.

PART II. THE HEALTH OCCUPATIONS

In 1966, about 3.0 million workers were employed in the health occupations. All except about 400,000 of these were employed in the health services industry described in Part I. (Health workers in other industries include nurses who provide emergency or other types of health services in business firms and pharmacists in the retail drug industry.) An analysis of all health occupations is not presented here for a variety of reasons, including lack of data and staff and time limitations. However, the 15 occupations discussed in this chapter represent nearly 2.5 million workers, or about 5 out of 6 of all those employed in health occupations in 1966. The occupations discussed are physician; dentist; optometrist; podiatrist; professional nurse; licensed practical nurse; aid, orderly, and attendant; pharmacist; medical x-ray technician; medical laboratory assistant; medical technologist; physical therapist; medical record librarian; occupational therapist; and dietitian. Those excluded are primarily engaged in medical research; clerical work; the collection, presentation, and analysis of health statistics; social work; and rehabilitation.

It bears repeating that the projections of manpower needs presented here are estimates of the effective demand for workers in 1975, developed under a specific set of assumptions rather than perceptions of needs based on provision of specific standards or goals of medical care. For example, the estimate of physician requirements is based on the anticipated increases in demand for their services resulting from such factors as population growth, rising expenditures for health care, rising research expenditures, and the need to overcome current shortages; it is not based on estimates of the need for physicians to provide some predetermined standard of care. Similarly, estimates of the needs for nursing personnel--professional nurses, practical nurses, and nurse aids, orderlies, and attendants--utilize a continuation of patterns of employer utilization, rather than estimates of utilization that professional perceptions indicate would be needed to provide some desired level (or goal) of nursing care. Estimates of health manpower requirements based on professional perceptions of needs are generally higher than the levels indicated by projections of effective demand such as those presented in this report. For example, in Health Manpower Perspective: 1967, a recent report prepared by the Public Health Service, professional perceptions of needs for dentists in 1975 are nearly 10 percent higher than in this report, professional nurses 16 percent higher, and physical therapists twice the level indicated in this report.

The occupational projections presented here were developed under the same basic framework as the "judgment" industry projections and are directly comparable. Alternative occupational projections comparable to the alternative industry projections were not made because much of the information needed to develop them is not available. Furthermore, factors other than industry employment may have a more significant bearing on manpower needs. For example, the number of X-rays to be taken in 1975 is more directly related to the need for X-ray technicians than the health industry employment level. Clearly, the development of alternative projections of manpower needs in health occupations is an area of health manpower research where additional work is needed.

It also bears repeating that the occupational projections are not meant to represent actual employment levels in 1975. Actual employment levels reflect the interaction of demand and supply. Since the requirement projections were developed without taking into account limitations of the future supply of personnel, the projected numbers must be viewed as representing manpower needs and not actual employment.

Physicians

Employment. Nearly 295,000 physicians[14] were professionally active in the United states in mid-1966, about one-third more than the 220,000 employed in 1950. About 190,000, more than three-fifths of the total, were engaged in private practice in mid-1966. About 45,000 were interns or residents in hospitals. About 30,000 held full-time staff positions in hospitals, nearly three-fifths of whom were in government hospitals. The remainder were employed in business firms, State and local health departments, medical schools, research foundations, and professional organizations.

Shortages. Many reports have been concerned about current shortages of physicians. However, identification of the extent of a "shortage" of physicians in quantitative terms, is very difficult to make. Not only is there lack of information, but there also is no clear-cut definition of "shortage." Nevertheless, many health experts indicate that shortages exist primarily in some geographical areas and in some medical specialities. Practitioners in almost every 1 of the 35 recognized specialties have indicated concern for unfilled needs. For example, an analysis by the Public Health Service of the need for physicians to improve standards of care, based on the stafffing patterns of six prepaid group practice organizations[15] disclosed estimated unfilled needs for about 20,000 physicians. The Public Health Service also reports unmet needs for 10,000 to 15,000 psychiatrists, and vacancies for about 10,000 hospital staff members, including interns and residents.

Projected needs. Manpower needs for physicians (M.D.'s and D.O.'s) are expected to rise from nearly 295,000 to more than 390,000 between 1966 and 1975, or by about one-third. This represents a faster annual rate of growth than in the 1950-66 period. However, the number of new graduates of medical schools limited employment growth in the past, whereas the projected 1975 requirements were made without consideration of possible future supply limitations.

In addition to growth needs of 95,000 physicians, about 50,000 will be needed to replace those who are expected to die, retire, or stop practicing because of other reasons between 1966 and 1975.[16]

Many factors underlie the expected rapid growth in requirements for physicians between 1966 and 1975. The most important factor is the increasing population, particularly the increasing number of older persons and the very young. The number of persons aged 65 and over is expected to increase from 18.5 million in 1966 to 21.2 million in 1975 and the number of persons under 5 from 19.9 million to 24.4 million. According to data from the National Health Survey, physicians' visits per person per year for people 65 years and over was about one and one-half times as great as the average number of visits for all persons in 1964 and for persons under 5 years about one and one-fifth as large. It is expected that the differential will become even greater for persons over 65 years in the future, since Medicare provides for increased expenditures for the medical care of older persons.

The anticipated rise in medical expenditures between 1965 and 1975 also is expected to result in a rising effective economic demand for physicians' services by all age groups. Furthermore, it is expected that the number of

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[14] This includes 282,000 Doctors of Medicine (M.D.'s) and 12,000 Doctors of Osteopathy (D.O.'s).

[15] Health Manpower Perspective: 1967, Bureau of [illegible]th Manpower, Public Health Service. (I[illegible]

[16] See Appendix table A-3 for estimated 1966 employment, projected 1975 requirements, and growth and replacement needs for physicians and several other occupations analyzed in this report.

persons having very low incomes, who often are forced to forego medical care in order to purchase other goods and services, will decrease as a proportion of the population, partly because of increasingly favorable employment opportunities and partly as a result of the Great Society programs.

An increasing number of physicians also will be needed to conduct research; it is expected that the number of physicians primarily needed to conduct research may double from the 4,600 employed in 1966. More and more emphasis is being placed on research into the prevention and cure of disease. Expenditures for research are expected to continue to increase rapidly, although the rate of growth may be slower than in recent years. Furthermore, new technological developments resulting from this research--such as the discovery of new surgical techniques, new drugs, and other treatments for diseases--also should increase the demand for physician services in private practice.

Employment requirements for physicians to teach in colleges and universities also are expected to increase over the 1966-75 period. More medical schools are being built, and existing facilities are being expanded as a result of the Health Professions Educational Assistant Act of 1963. If enough physicians are to be trained to meet the 1975 manpower needs indicated in this report, the number of physicians engaged primarily in teaching will have to be increased from about 9,000 to about 15,500 between 1966 and 1975.

Supply. New medical school graduates and immigrants are the primary sources of supply for physicians in the United States.[17] To meet the projected need for 145,000 new physicians between 1966 and 1975--95,000 for growth and 50,000 for replacement--these sources would have to provide an annual average of about 16,100 new physicians over the 9-year period. If the annual number of immigrant physicians does not change significantly from the level of recent years, and if the number of graduates remains at the 1966 level, an annual average of about 9,500 persons would enter the physician work force each year between 1966 and 1975. On this basis, the average annual output of our medical schools would have to be increased by more than 6,600 if requirements presented above were to be met. Some of this increase in the number of medical school graduates is expected as a result of assistance received under the Health Professions Educational Assistance Act of 1963. For example, projects to increase the enrollment of medical schools by more than 1,200 were approved and funded under this act as of March 1967.

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[17] About 15 percent of all entrants to the United States physician work force were immigrants in 1966.

Dentists

Employment. About 97,500 dentists were employed in the United States in 1966, nearly 10 percent more than the 89,000 employed in 1956. Nine out of ten dentists were in private practice in 1966. Approximately 6,500 dentists were serving as commissioned officers in the Armed Forces, and about 1,300 held other positions in the Federal Government, chiefly in the hospitals and clinics of the Veterans Adminstration and the Public Health Service. The remainder were employed primarily in colleges
i universities, non-Federal hospitals, and
ıte and Local health agencies.

Shortages. Measuring shortages of dentists, as for physicians and other health practitioners, is very difficult. One measure, the ratio of dentists to population, shows a decrease in recent years. However, individual dentists have been able to care for more patients because of increases in efficiency due to new equipment and the use of more auxiliary personnel.

Projected Needs. Manpower needs for dentists are expected to rise from 97,500 in 1966 to about 125,000 in 1975, or about 28 percent. This represents a faster annual rate of growth than

in the 1956-66 period. However, the number of new graduates of dental schools limited employment growth in the past, whereas the projected 1975 requirements were made without consideration of possible future supply limitations.

In addition to growth needs of about 27,500, about 17,500 dentists will be needed to replace those who die or stop practicing for other reasons over the 1966-75 period.

The factors underlying the expected rapid growth in demand for dentists' services are similar to those that will increase the demand for all health workers, primarily growth in population and the increasing ability of persons to pay for medical care. In addition, more people are expected to seek dentists' services because of the growing awareness of the importance of regular dental care and the development of new payment plans that make it easier for people of moderate means to obtain dental service. Expansion of research activities in the field of dentistry and the growth of dental schools also will require more dentists; in part, this development will be the result of financial assistance obtained by dental schools under the Health Professions Educational Assistance Act of 1963. More dentists also will be needed to administer new dental public health programs.

Technological developments, such as new equipment and drugs, as well as the more extensive employment of dental hygienists, assistants, and laboratory technicians, should permit each individual dentist to care for more patients. Although improved dental hygiene and more widespread use of fluorides in community water supplies will prevent some tooth and gum disorders, such measures probably will increase rather than decrease the demand for dental services, by preserving teeth that might otherwise be extracted.

Supply. The supply of new dentists in the United States is drawn primarily from graduates of dental schools. To meet projected needs for 45,000 new dentists between 1966 and 1975--27,500 for growth and 17,500 for replacement--an average of 5,000 new dentists would have to graduate each year over the 9-year period. In 1966, only about 3,200 dentists graduated from these schools. Thus, to meet the projected requirements presented above, the annual number of graduates of dental schools will have to be increased substantially above current levels between 1966 and 1975. Some increase in dental school facilities is expected as a result of financial assistance under the Health Professions Educational Assistance Act of 1963. For example, projects to increase enrollments in dental schools by nearly 600 were approved and funded as of March 1967.

Optometrists

Employment. Approximately 17,000 optometrists were employed in the United States in 1966, almost unchanged from the early 1950's. More than nine-tenths of all optometrists employed in 1966 were self-employed. Most of the remainder worked for established practitioners, health clinics, hospitals, optical instrument manufacturers, or government agencies. A few taught in colleges of optometry and some were serving in the Armed Forces.

Shortages. The very limited information available indicates that shortages of optometrists currently exist in some areas of the country. Generally, shortages are most acute in small communities.[18] In most large cities it is estimated that the demand for the services of optometrists is being met by the existing supply of optometrists. For example, in the Northeastern States the ratio of population to optometrists is about 9,000 persons to one optometrist; in Virginia, North Carolina, Georgia, and Alabama the ratio is 1-1/2 to 2 times as much.

[18] See Monograph on Optometry, American Optometric Association, 1966.

Projected Needs, Employment requirements for optometrists are expected to increase from 17,000 to 20,000 between 1966 and 1975. In addition to the growth needs of 3,000 optometrists about 3,100 will be needed to replace those who are expected to die, retire, or leave the labor force for other reasons between 1966 and 1975.

The demand for the services of optometrists is expected to rise primarily as a result of the basic factors that will increase the demand for other health workers--population growth and the increasing ability of individuals to pay for health care. In addition, the general public is becoming more conscious of the need for regular vision examinations because greater demands are being made on the eyes. In addition, there is increasingly greater recognition of the importance of good vision for efficiency at work and in school. The increasing use of assistants and technicians in optometrists' offices, however, will tend to offset somewhat the growth of employment requirements for optometrists.

Supply. New graduates of schools of optometry are the primary source of supply for new optometrists in the United States. To meet the projected need for 6,100 optometrists between 1966 and 1975--3,000 for growth and 3,100 for replacement--schools would have to provide an annual average of nearly 700 graduates over this period. In 1966, optometry schools produced only about 400 graduates. Thus, to meet projected 1975 requirements, the average annual number of graduates of our schools of optometry must increase by about three-fourths. Part of the increase is expected to be met by expanded training facilities resulting from assistance received under the Health Professions Educational Assistance Act of 1963. For example, projects to increase enrollments of schools of optometry by about 80 were approved and funded as of March 1967.

Podiatrists

Employment. Approximately 8,000 podiatrists were employed in the United States in 1966. This represents an increase of one-fourth over the 1950 employment of about 6,400. Nearly all podiatrists employed in 1966 were in private practice. The few who held full-time salaried positions worked primarily in hospitals, podiatry colleges, or for other podiatrists.

Shortages. As for physicians and dentists, it is difficult to identify or measure a shortage of podiatrists. One measure of shortage is the ratio of podiatrists to population. According to the American Podiatry Association, the ratio needed to have a "desired" standard of care is much higher than the actual ratio in 1966, and, therefore, a shortage is implied.

Projected Needs. Employment requirements for podiatrists are expected to increase from 8,000 to 9,600 between 1966 and 1975, or by about one-fifth. This represents an annual rate of growth somewhat faster than over the 1950-66 period.

The demand for the services of podiatrists is expected to rise primarily as a result of the basic factors that will increase the demand for other health workers--population growth and the rising ability of individuals to pay for health care. Of special importance is the growth of the number of older persons, the age group most needing foot care. Furthermore, the trend toward providing preventive foot care for children is increasing.

In addition to podiatrists needed for growth of the profession, about 1,400 will be needed to replace those who die, retire, or stop practicing for other reasons.

Supply. The supply of new podiatrists in the United States is drawn primarily from new graduates of podiatry colleges. To meet projected needs for 3,000 podiatrists between 1966 and 1975--1,600 for growth and 1,400 for replacement--an average of about 330 new podiatrists would have to be graduated each year over the 9-year period. In 1966, only about 125

students graduated from podiatry schools. Thus, to meet the projected requirements presented above, the average annual number of graduates of podiatry colleges must be increased substantially above current levels between 1966 and 1975. Some increases in facilities are expected as a result of funds provided by the Health Professions Educational Assistance Act of 1963. However, a great deal of additional action is necessary, both to increase the capacity of schools and to attract students to the schools.

Pharmacists

Employment. Approximately 120,000 pharmacists were employed in the United States in 1966, about 8 percent more than the 111,000 employed in 1955. In 1966, about 104,000 worked in retail pharmacies--approximately half of these were owners or part-owners of drugstores. Most of the remainder were employed by pharmaceutical manufacturers and wholesalers, or worked in hospitals. Others worked in the clinics of the Veterans Administration and the U.S. Public Health Service, the Food and Drug Administration, taught in colleges of pharmacy, or served in the Armed Forces.

Shortages. The limited information available indicates that no general shortage of pharmacists exists, although unfilled job openings have been reported in many localities. For example, information on current urgent staffing needs obtained in the 1966 AHA-PHS survey of hospitals indicates urgent needs for about 600 pharmacists.

Projected Needs. Employment requirements for pharmacists are expected to increase by about 5 percent between 1966 and 1975, rising from about 120,000 to 126,000. This represents a slightly slower rate of growth than in the 1955-66 period. The demand for prescriptions, however, is expected to increase rapidly during the 1966-75 period, as a result of population growth, expansion in the number of pharmaceutical products, and the increasing ability of persons to pay for drugs. Despite the expected increase in the use of drugs, however, the continued trend towards pharmaceuticals prepared by manufacturers (rather than in drugstores), larger drugstores, and the greater use of pharmacists assistants, will partially offset the growth of employment requirements for pharmacists.

The greatest manpower needs for pharmacists will be for replacement of those who die, retire, or leave the labor force for other reasons or transfer to other occupations. About 32,000 new pharmacists will be needed just to replace workers who die, retire, or otherwise leave the labor force between 1966 and 1975.

Supply. The new supply of pharmacists in the United States is drawn primarily from new graduates of colleges of pharmacy. To meet the projected need of 38,000--6,000 for growth and 32,000 for replacement--these schools would have to provide an annual average of more than 4,200 new pharmacists over the 9-year period. In 1966, about 3,700 students graduated from colleges of pharmacy. Thus, to meet projected requirements, the average number of graduates between 1966 and 1975 must be increased by about 500 annually, or by more than one-eighth. Since reports from colleges of pharmacy indicate that not all schools are filled to capacity, part of this increase could be met by programs designed to attract students, including those that publicize favorable employment opportunities and the availability of financial assistance for students. Construction of schools in new locations also could increase the number of students by attracting those who could not attend schools that are far from their homes.

Registered Nurses

Employment. About 620,000 registered professional nurses were employed in the United States early in 1966, two-thirds more than the 375,000 employed in 1950. Approximately two-thirds worked in hospitals and related institutions in 1966. About 65,000 were private duty nurses who cared for patients in hospitals and private homes, and nearly 50,000 were employed in offices of physicians and other medical practitioners. Public health nurses in government agencies, visiting nurse associations, and clinics numbered about 40,000. Nurse educators in nursing schools accounted for more than 22,000 and occupational health nurses in industry for about 18,000. A few thousand nurses were employed as staff members of professional nurse organizations and State boards of nursing or were employed by private research organizations.

Shortages. More attention has been focused on the shortage of registered nurses than perhaps on that of any other of the health occupations. A few hospitals have even reported closing facilities because of the nursing shortage. Until the recent American Hospital Association-Public Health Service study was conducted, however, quantification of the shortage, at least on a national basis, was lacking.[19] In 1966, according to the AHA-PHS study, hospitals indicated urgent needs for about 57,000 nurses. The study of needs in nursing homes conducted by the Public Health Service in 1966 indicated an urgent need for an additional 5,000 nurses.

Projected Needs. Based on an analysis of the number of patients who will need nursing care, expenditures for health care, technological developments, elimination of current shortages, and employer utilization patterns, employment requirements for registered nurses are expected to rise from 620,000 to 860,000 between 1966 and 1975. This represents a slightly faster rate of growth than in the 1950-66 period.

In addition to the 240,000 needed to meet growth requirements, an estimated 150,000 will be needed to replace nurses who leave the labor force because of death, retirement, family responsibility, or other reasons between 1966 and 1975. This replacement figure is a "net" figure, after allowance is made for inactive nurses who may return to the field. About 300,000 nurses actually are expected to leave the labor force between 1966 and 1975.

Many factors underlie the expected rapid growth in requirements for registered nurses. One major factor is the growing number of patients who will require nursing care resulting from the increasing population, and the rising expenditures for health care, in part resulting from Medicare. Increasing numbers also will be needed to work in the growing number of physicians' offices, and many more will be required to serve as occupational nurses in business firms as total industry employment increases.

Additional numbers of nurses also will be needed to teach in nursing schools. More schools are being built, and existing facilities expanded as a result of the Health Professions Educational Assistance Act of 1963 and the Nurse Training Act of 1964. Furthermore, it is expected that increasing numbers of young women enroll in nursing schools as information on employment opportunities and financial assistance (provided by the Nurse Training Act) become more widely publicized.

Some technological developments also should increase the demand for nurses. For example. the development and more wide-

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[19] For example, the most extensive study of nursing manpower conducted in recent years, Toward Quality in Nursing, a report of the Surgeon General's Consultant Group on Nursing; U.S. Department of Health, Education, and Welfare, Public Health Service, February 1963, did not quantify the current shortage.

spread use of new drugs, medicines, and other treatments probably will result in many more people seeking medical help, thereby creating an increased demand for nursing care.

On the other hand, labor saving technological developments will partially offset the growth in demand for professional nursing care. The most significant developments will take place in hospitals and related institutions, including changes in building design that eliminate time spent walking; the use of computers to record a patient's physiological condition; and electric monitoring devices that keep the nurse informed of a patient's condition.

Hospitals and nursing homes are also expected to continue to employ larger numbers of practical nurses and aids, orderlies, and attendants relative to the number of registered nurses, primarily because these workers are not in as short supply as registered nurses and their salaries are lower.

Supply. Graduates of nursing schools are the primary source of new nurses in the United States.[20] To meet projected needs for 390,000 new nurses between 1966 and 1975 (240,000 for growth and 150,000 for replacement) nursing schools will have to provide an annual average of about 43,000 over the 9-year period. In 1966, about 35,000 persons graduated from these schools, and not all of them entered nursing. Thus, to meet projected requirements, the annual number of graduates must be increased by an average of at least 8,000 a year between 1966 and 1975.

Assistance to nursing schools under the Nurse Training Act of 1964 and the Health Professions Educational Assistance Act of 1963 will result in some increase in the number of nursing graduates. For example, as of April 1967, construction projects were approved under these acts to increase enrollments by about 3,000. However, nursing schools will be facing increasing competition for students. Employment opportunities for graduates in other subject fields also are expected to continue to increase rapidly between 1966 and 1975, and students undoubtedly will be attracted to other programs of study. Since nursing schools currently are not filled to capacity, action should be taken to recruit young people into nursing schools by increasing relative salaries of nurses, improving working conditions, or otherwise increasing the desirability of work in the profession.

[20] Many nurses also reenter the labor force each year. These workers were accounted for in the discussion of replacement needs.

Licensed Practical Nurses

Employment. About 300,000 practical nurses were employed in the United States in 1966, nearly two and one-fifth times as many as the 137,000 employed in 1950. Of the total in 1966, approximately 150,000 were employed by hospitals and an estimated 35,000 by nursing homes and other extended care facilities. Many were private duty practical nurses working in the homes of their patients, or in hospitals. Others were employed by public health agencies and welfare and religious organizations.

Shortages. According to surveys of hospitals and nursing homes by the AHA and PHS, practical nursing is one of the greatest shortage occupations in the health field. In hospitals, it was estimated that more than 14,000 practical nurses were urgently needed. Among all workers, only needs for professional nurses and aids, orderlies, and attendants were significantly greater. In nursing homes, urgent needs for practical nurses (7,700) were greater than for any other occupation.

Projected Needs. Employment requirements for practical nurses are expected to rise from 300,000 to about 465,000 between 1966 and 1975, an increase of 55 percent. This represents an

annual rate of growth somewhat slower than in the 1950-66 period. In addition to growth needs of 165,000, an estimated 125,000 will be needed to replace practical nurses who leave the labor force because of death, retirement, family responsibility, or other reasons. This replacement figure reflects "net" losses. The number of practical nurses who are expected to leave the labor force between 1966 and 1975 is actually much more than 125,000 but many will return to their jobs and thus should not require replacement. The limited information available indicates that about one-third of all licensed practical nurses who leave the labor force eventually return.

The rapid growth in demand for practical nurses is expected to result from the same factors increasing the demand for other health workers, including population growth, rising health expenditures, expansion of prepayment insurance plans, and growing public health programs. In addition, hospitals and nursing homes are expected to continue to employ more licensed practical nurses relative to professional nurses. These institutions are changing the duties of nursing personnel so that some of the less skilled nursing tasks may be done by practical nurses, thereby freeing registered nurses for more responsible jobs.

Technological developments will tend to limit somewhat the growth in requirements for licensed practical nurses. For example, the increasing use of disposable items such as hypodermic syringes and surgical gloves will reduce the need for practical nurses who clean and sterilize reusable items. On the other hand, technological developments that will increase the overall demand for health care, described earlier, will have the effect of increasing the demand for licensed practical nurses.

Supply. Graduates of practical nurse training programs are the primary source of new licensed practical nurses.[21] To meet projected needs for 290,000 new practical nurses between 1966 and 1975--165,000 for growth and 125,000 for replacement--training programs would have to provide an average of about 32,000 annually over the 9-year period. In 1966, about 25,000 persons graduated from these programs, and not all of them became licensed practical nurses. Thus, to meet projected requirements, the annual number of graduates would have to be increased by an average of at least 7,000 a year between 1966 and 1975. Some of this increase probably will result from an increase in the capacity of schools. However, since all schools currently are not filled to capacity, action should be taken to increase relative salaries of licensed practical nurses, improve working conditions, or otherwise improve the desirability of work as a practical nurse.

[21] Many licensed practical nurses also reenter the labor force each year. However, these workers are excluded from the discussion of supply because they were accounted for in the discussion of replacement needs.

Aids, Orderlies, and Attendants

Employment. Approximately 700,000 nurse aids, orderlies, and attendants were employed in the United States in 1966, more than three times as many as the 220,000 employed in 1950. About 500,000 worked in hospitals and more than 150,000 were employed in nursing homes. The remainder were employed in offices of physicians and other medical practitioners, in sanitariums, and in other institutions providing facilities for care and recuperation.

Shortages. Shortages of aids, orderlies, and attendants have been reported throughout the country. According to the AHA-PHS surveys, reported needs for these workers were greater than for any other occupation except regis-

tered nurses. Needs for 29,000 aids, orderlies, and attendants were estimated--22,000 in hospitals and 7,000 in nursing homes.

Projected Needs. Employment requirements for aids, orderlies, and attendants are expected to increase from about 700,000 to nearly 1.1 million between 1966 and 1975, or by nearly three-fifths. This represents a slower rate of growth than in the 1950-66 period.

In addition to the growth needs of nearly 400,000, more than 300,000 of these workers will be needed to replace those who leave the labor force because of death, retirement, family responsibility, or other reasons between 1966 and 1975. This replacement estimate utilizes a net loss concept. The number of aids, orderlies, and attendants who are expected to leave the labor force between 1966 and 1975 is actually much greater than 300,000, but many will return to their jobs and thus should not require replacement.

The very rapid growth in demand for aids, orderlies, and attendants will stem from the same factors increasing the need for other health workers, including population growth, rising health expenditures, expansion of prepayment insurance plans, and growing public health programs. In addition, hospitals, nursing homes, and other similar institutions are expected to use more of these workers relative to other nursing personnel (professional nurses). These institutions also are changing the job content of nursing jobs so that the less complex duties can be performed by aids, orderlies, and attendants; this will allow the more highly trained professional and practical nursing personnel more time for other duties.

Technological developments will tend to limit the growth in requirements for aids, orderlies, and attendants. The use of electronic monitoring devices, improved designs of hospitals, and the use of disposable items will have the effect of saving time for nursing personnel. On the other hand, some technological developments, such as the development of new techniques for treating disease, will increase the demand for medical care and, therefore, raise the employment needs for aids, orderlies, and attendants as well as other workers.

Supply. Employers generally do not require nurse aids, orderlies, and attendants to have occupational training prior to employment. These workers are generally trained on the job, sometimes in formal on-the-job training programs. The length of the program may vary from several days to a few months depending on the policies of the hospital, the workers' aptitude for the work, and the nature of the assigned duties.

Because of the prevalence of on-the-job training programs, the task of training workers to meet requirements thus falls on the employing institutions rather than on educational institutions. Although some of the training in recent years has been conducted under MDTA institutional training programs, part of this training is conducted in hospitals. (About 27,000 persons enrolled in MDTA institutional programs for aids, orderlies, and attendants between August 1962 and December 1966.)

Because persons without a high school diploma generally can enroll in training programs for aids, orderlies, and attendants, it is likely that the gross supply of these persons would be sufficient to fill training programs. The primary concern, therefore, is to attract these workers to aid, orderly, and attendant training programs by publicizing opportunities for employment, and by establishing salary structures which make these jobs competitive with others requiring similar educational background.

Occupational Therapists

Employment. About 6,500 occupational therapists were employed in 1966, three and one-fourth times as many as the 2,000 employed in 1950. In 1966, about 85 percent of the total worked in hospitals, nursing homes, sanitariums, or other extended care facilities. Some were employed in special workshops, camps for handicapped children, and State and local health departments, and others were employed in home-visiting programs for patients unable to attend clinics or workshops.

Shortages. The AHA and PHS surveys of hospitals and extended care facilities indicate that occupational therapists are in very short supply. The hospital survey indicated an urgent need for 1,200 occupational therapists and the extended care facilities survey indicated a need for 400. Thus, employment of occupational therapists would have to be increased by about one-fourth if current urgent staffing needs were to be met.

Projected Needs. Employment requirements for occupational therapists are expected to continue to increase rapidly from about 6,500 to about 16,500 between 1966 and 1975, an increase of more than 150 percent. This represents a faster annual rate of growth than in the 1950-66 period. However, the number of new graduates of occupational therapy programs limited employment growth in the past, whereas the projected 1975 requirements were made without consideration of possible future supply limitations.

The demand for the services of occupational therapists is expected to increase very rapidly as interest in the rehabilitation of disabled persons and the success of established occupational therapy programs continues to increase. There will be a particularly large increase in the need for therapists to work with psychiatric patients, children, and the aged, as well as with persons suffering from cerebral palsy, mental retardation, and heart disease. In addition, more therapists will be needed for work in home care programs and in community health centers.

In addition to occupational therapists needed for the growth of the occupation, about 3,000 will be needed to replace those who die, retire, or leave the labor force for family or other reasons.[22]

Supply. The primary source of supply of occupational therapists is new bachelor's degree graduates of 4-year college programs in occupational therapy. Others enter the occupation after completing 2 years of a different college curriculum and a 2-year occupational therapy curriculum leading to a bachelor's degree. Some persons having bachelor's degrees in other fields enter the occupation after completing occupational therapy programs lasting 18 to 22 months and receiving a certificate in occupational therapy. All new therapists must have 6 to 9 months of clinical experience.

In 1966, about 550 persons received a bachelor's degree or a certificate in occupational therapy. To meet projected needs for 13,000 therapists between 1966 and 1975--10,000 for growth and 3,000 for replacements--training programs will have to provide an annual average of about 1,450 graduates over the 9-year period. Thus, over the 9-year period, graduates must increase by an average of about 900 a year if requirements are to be met. To achieve this goal, action is necessary both to increase the training capacity of occupational therapy schools, and to attract students to these courses.

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[22] These are estimated net losses--separations from the labor force minus returnees.

Physical Therapists

Employment. About 12,500 physical therapists were employed in 1966, two and three-fourths times as many as the 4,600 employed in 1950. In 1966, about 8,500 worked in hospitals and 2,000 in nursing homes and other extended care facilities. Others were employed in home-visiting programs for patients unable to attend clinics or workshops, camps for handicapped children, and in State health departments.

Shortages. The reports of the AHA-PHS survey of extended care facilities indicate that physical therapists are in very short supply. Employment of physical therapists in nursing homes would have to be increased by about one-third if urgent staffing needs were to be met, whereas a 10 percent employment increase would be needed to fill hospital needs.

Projected Needs. Employment requirements for physical therapists are expected to continue to increase rapidly from 12,500 to about 27,000 between 1966 and 1975, an increase of 116 percent. This represents a faster annual rate of growth than in the 1950-66 period. However, the number of new graduates of physical therapy programs limited employment growth in the past, whereas the projected 1975 requirements were made without consideration of possible future supply limitations.

Manpower needs are expected to increase between 1966 and 1975 as existing rehabilitation centers are enlarged and new ones are built. Growth of programs to aid crippled children and increase vocational rehabilitation activities should further raise the demand for physical therapists. In addition, more physicians are expected to recommend physical therapy for their patients as techniques and equipment for treatment improve.

In addition to the physical therapists needed for the growth of the occupation, about 5,000 will be needed to replace those who will die, retire, or leave the labor force for family or other reasons over the 1966-75 period.[23]

Supply. There are two primary sources of new physical therapists in the United States: (1) Graduates of physical therapy programs leading to a bachelor's degree, and (2) graduates of 12 to 16 months certificate programs offered to persons having a bachelor's degree in another field. To meet the projected need for 19,500 physical therapists between 1966 and 1975--14,500 for growth and 5,000 for replacements--these sources would have to provide an annual average of about 2,200 graduates over the 9-year period. In 1966, only about 950 persons graduated from these programs, and not all of them became physical therapists. Thus, to meet projected needs, the annual average number of graduates would have to more than double over the 1966-75 period.

Nearly all schools of physical therapy are filled to capacity. To increase the number of graduates, therefore, it will be necessary to expand existing institutions and to build new ones. Some of this increase is expected to result from contruction assistance under provisions of the Allied Health Professions Personnel Training Act of 1966.

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[23] These are estimated net losses--separations from the labor force minus returnees.

Medical Technologists

Employment. Approximately 40,000 medical technologists were employed in 1966. An estimated three-fourths of the total were employed in hospitals. Most of the remainder were employed by public health agencies, blood banks, private clinical laboratories, research institutions, and pharmaceutical manufacturers.

Shortages. Shortages of qualified medical technologists have been reported throughout the

country. According to the 1966 AHA-PHS survey of hospitals, it was one of the occupations having great unmet needs. The reports showed that to meet the most urgent needs of hospitals in 1966, employment would have to increase nearly 10 percent.

Projected Needs. Manpower requirements for medical technologists are expected to increase from about 40,000 to 75,000 between 1966 and 1975. In addition to this growth need of 35,000, about 15,000 will be needed to replace those who are expected to die, retire, or leave the labor force for other reasons between 1966 and 1975.[24]

The demand for medical technologists will increase because of the same basic factors that underlie the rising demand for all health manpower. In addition, the need for medical technologists will grow as physicians depend increasingly upon laboratory tests in the diagnosis and treatment of disease. The growing complexity of laboratory techniques and the use of more complex instruments also will require more medical technologists.

Supply. Graduates of schools of medical technology accredited by the American Medical Association are the primary source of new medical technologists. To meet projected needs for about 50,000 medical technologists between 1966 and 1975--35,000 for growth and 15,000 for replacements--an annual average of about 5,500 such graduates will be needed over the 9-year period. In 1966, about 780 AMA accredited schools of medical technology provided about 3,500 graduates, not all of whom became medical technologists. Thus, to meet projected requirements, the average annual number of graduates must be increased by at least 2,000 between 1966 and 1975.

Reports from the institutions that train medical technologists indicate that they currently are filled only to about two-thirds of capacity. Thus, to meet occupational needs, additional students must be attracted to these schools. Programs should be initiated to publicize the availability of employment opportunities and to increase the desirability of work as a medical technologist, particularly by raising salary levels.

[24] These are estimated net losses--separations from the labor force minus returnees.

Medical Laboratory Assistants

Employment. Approximately 50,000 medical laboratory assistants were employed in 1966.[25] It is estimated that about three-fourths were employed in hospitals. Others were employed in public and private clinical laboratories, public health agencies, pharmaceutical laboratories, and physicians' offices.

Shortages. Personnel shortages are estimated to be smaller for medical laboratory assistants than for more highly trained laboratory workers such as medical technologists. For example, according to the AHA-PHS survey of staffing needs of hospitals in 1966, employment of laboratory assistants would have to rise 5 percent to meet the most urgent needs, compared with a 10 percent rise needed to meet the most urgent staffing needs for medical technologists.

Projected Needs. Employment requirements for medical laboratory assistants are expected to increase from about 50,000 to 100,000 between 1966 and 1975. In addition to these growth needs of about 50,000, about 20,000 will be needed over the 1966-75 period because of net losses

[25] Medical laboratory assistants in this report included workers who generally require 1 to 2 years of post-secondary training or the equivalent in experience.

resulting from deaths, retirements, and other separations from the labor force.[26]

The demand for medical laboratory assistants is expected to increase as a result of the same basic factors that underlie the growing demand for all health workers. Technological developments that result in new laboratory techniques and, thereby, permit more varieties as well as increasing numbers of tests to be performed are expected to be a significant factor underlying the increase in the demand for assistants. On the other hand, the development of automated equipment that reduces the need for personnel to do simple repetitive tasks may tend to partially offset the growth in demand for the services of medical laboratory assistants.

[26] Net losses include separations from the labor force minus returnees.

Supply. Most medical laboratory assistants employed in 1966 acquired their training on the job. In recent years, however, an increasing number have been trained in academic programs conducted by hospitals or by vocational schools and junior colleges in cooperation with hospitals. Programs offered in hospitals generally last about 1 year, and those in vocational schools and junior colleges generally last about 2 years.

Since workers usually can enroll in training programs for assistants with only a high school diploma, it is assumed that the gross supply of persons will be sufficient to fill training programs. The primary concern, therefore, is to attract people to the training programs. This can be done by publicizing opportunities for employment and by establishing salary structures that make these jobs competitive with others that require similar educational backgrounds.

Medical X-ray Technicians

Employment. Approximately 72,000 medical X-ray technicians were employed in 1966, about two and one-third times as many as employed in 1950. In 1966, about one-fourth were employed by hospitals. The remainder were employed primarily in medical laboratories, physicians' and dentists' offices, clinics, Federal and State health agencies, and school systems.

Shortages. The AHA-PHS survey of staffing needs in hospitals in 1966 indicates that many openings for technicians were unfilled. Preliminary results of this survey show unfilled needs for about 1,000 medical X-ray technicians.

Projected Needs. Employment requirements for medical X-ray technicians are expected to increase from about 72,000 to about 100,000 between 1966 and 1975, or by nearly two-fifths. This represents an annual rate of growth somewhat slower than in the 1950-66 period. The basic factors that underlie the expected increase in demand for other types of health workers--including population growth and the increasing ability of persons to pay for health care--should increase demand for X-ray technicians. In addition, X-ray equipment is expected to be used more frequently in the diagnosis and treatment of disease. X-ray technicians also will be needed to administer radiotherapy, as new knowledge of the medical benefits of radioactive materials becomes more widespread. Routine X-raying of large groups of people will be extended as part of disease prevention and control programs. For example, many employers now require chest X-rays of all employees, and most insurance companies include a chest X-ray as part of the physical examination required for an insurance policy.

In addition to the medical X-ray technicians needed for the growth of the occupation, about 23,000 will be needed because of net losses resulting from deaths, retirements, or other separations from the labor force over the 1966-75 period.[27]

[27] Net losses include separations from the labor force minus returnees.

Supply. Training programs in X-ray technology offered by hospitals and by medical schools affiliated with hospitals are the primary source of new medical technicians. These programs usually last about 24 months, but a few are 3-year programs or 4-year programs that lead to a bachelor's degree. Some junior colleges coordinate academic training with work experience in hospitals in 3-year X-ray technician programs and offer an associate of arts degree. In 1966, approximately 1,000 schools of X-ray technology were approved by the American Medical Association. In addition to training programs offered in hospitals, training also is provided by the Armed Forces.

In 1966, about 4,200 persons graduated from programs which were approved by the American Medical Association. To meet the requirements for about 51,000 additional X-ray technicians between 1966 and 1975 (28,000 for growth and 23,000 for replacements), an annual average of about 5,600 persons will have to be trained. Thus, if only relatively few entrants come from the Armed Forces or other sources, the average annual numer of graduates of technology schools must be increased by about one-third.

Reports from schools that provide training for X-ray technicians indicate that the schools are not filled to capacity. Thus, to meet occupational needs, additional students must be attracted to these schools. Programs should be initiated to publicize the availability of employment opportunities and to increase the desirability of work as an X-ray technician, particularly by raising salary levels.

Medical Record Librarians

Employment. About 12,000 medical record librarians were employed in 1966, mostly in hospitals.[28] The remainder were employed in clinics, medical research centers, medical departments of insurance companies, and in State and local health departments.

Shortages. Reports from the AHA-PHS survey indicate that many hospital positions for medical record librarians were unfilled in 1966. Preliminary survey results show that employment would have to be increased about 10 percent, if the most urgent staffing needs for medical record librarians were to be filled.

Projected Needs. Employment requirements for medical record librarians are expected to increase from about 12,000 to 18,000 between 1966 and 1975. The increasing number of hospitals and the growing volume and complexity of hospital records will continue to create a strong demand for medical record librarians. Information contained in medical records will become more important as a result of the increasing amount of clinical data needed for research on diseases, new drugs, and methods of treatment. More consultants and group supervisors also will be needed to help standardize records in areas where medical record librarians are not available.

In addition to the medical record librarians needed for the growth of the occupation, about 4,000 will be needed to replace those who die, retire, or leave the labor force for family or other reasons over the 1966-75 period.[29]

Supply. In 1966, 28 schools approved by the American Medical Association offered training in medical record library science or medical record administration. These schools, which are located in colleges and universities and in a few hospitals, have programs lasting about a year and are offered to students who have previously completed 2 years or more of college.

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[28] About 3,700 are registered with the American Association of Medical Record Librarians.

[29] These are estimated net losses--separations from the labor force minus returnees.

In 1966, about 190 persons graduated from these programs, far fewer than the number needed even for replacement needs. However, many other persons have entered the work force as medical record librarians, mostly after being trained on the job and/or with experience as assistants to medical record librarians. The task of training medical record librarians, therefore, will continue to fall primarily on employers. Thus, it would be beneficial if training for these workers in academic programs were expanded.

Dietitians

Employment. Approximately 30,000 dietitians were employed in 1966, an increase of 36 percent over the 22,000 employed in 1950. In 1966, more than two-fifths were employed by hospitals. Large numbers also were employed by nursing homes and other extended care facilities. Others worked for colleges and universities as teachers, or for school systems as dietitians in food-service programs. Most of the remainder worked for public health agencies, restaurants, and large companies that operate food-service programs for their employees.

Shortages. The AHA-PHS and PHS surveys indicate that many openings for dietitians are unfilled. These surveys indicate urgent needs for about 1,600 dietitians in hospitals and 500 in nursing homes and other extended care facilities. The limited information available indicates that shortages also exist in other types of employment.

Projected Needs. Employment requirements for dietitians are expected to increase from about 30,000 to nearly 38,000 between 1966 and 1975, or by one-third. This represents a faster annual rate of growth than in the 1950-66 period. The expected increase in the patient load of hospitals, nursing homes, and other extended care facilities, primarily because of population growth and the increasing ability of the population to pay for institutional care, should result in an increase in demand for dietitians' services. In addition, more dietitians will be needed to direct food-service programs for the growing number of schools, day care centers, and industrial plants, and to work in research and public health programs.

In addition to those needed to staff new positions, more than 9,000 dietitians will be needed to replace those who die, retire, or leave the labor force for family or other reasons over the 1966-75 period.[30]

Supply. Graduates of bachelor's degree programs offered in home economics departments of colleges and universities are the major source of new dietitians. A few enter after receiving bachelor's degrees in other fields of study.[31]

To meet the projected need for 17,000 dietitians between 1966 and 1975--8,000 for growth and 9,000 for replacements--these programs will have to provide an annual average of about 1,900 graduates over the 9-year period. Although more than 5,000 persons received degrees in home economics in 1966, only about one-fifth were estimated actually to have become dietitians. Another 100 entered the field from other degree programs. Thus, the number of entrants from these programs was only about 1,100 in 1966. The projected requirements for 1,900 dietitians a year could be met by (1) increasing the proportion of home economics graduates entering the labor force as dietitians; (2) by increasing the number of graduates of home economics curriculums; or (3) by increasing the number who enter from other

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[30] These are estimated net losses--separations from the labor force minus returnees.

[31] After completion of 4 years of college, the profession encourages completion of a one year internship program.

fields of study. Since the current number of graduates from home economics curriculums would be sufficient to meet employment requirements if two-fifths rather than one-fifth entered work as dietitians, the simplest solution is to attract these graduates to work as dietitians. This possibly could be done by publicizing employment opportunities, and by increasing salaries (at least to the level of other positions requiring similar educational and training backgrounds). However, attracting new home economics graduates to dietitian positions could create shortages of home economists. Therefore, an increase in the number of home economics graduates also is needed to avoid shortages in other occupations.

APPENDIX A. STATISTICAL TABLES

In the following tables, absolute figures are rounded to the nearest hundred, and percentages shown to two decimal places. Presentation of the figures in this form should not be construed as indicating that they have exactly this degree of precision.

Since all totals and percentages were calculated on the basis of unrounded figures, they do not always correspond exactly to those indicated by rounded figures in the tables.

Table A-1. Estimated Employment in the Medical and Health Services Industry, by Selected Occupation 1/, 1966

Occupation	Total		Hospitals		Medical and health services other than hospitals	
	Number	Percent	Number	Percent	Number	Percent
Total, all occupations.....	3,672,000	100.00	2,363,000	100.00	1,309,000	100.00
Professional and technical workers..	1,487,100	40.50	860,100	36.40	627,000	47.90
Engineers and natural scientists..	23,200	.63	11,300	.48	11,900	.91
Dentists.....	94,900	2.58	900	.04	94,000	7.19
Dietitians and nutritionists.....	18,200	.50	13,200	.56	5,000	.38
Registered nurses.....	584,100	15.91	395,900	16.75	188,200	14.38
Optometrists.....	13,900	.38	500	.02	13,400	1.02
Pharmacists.....	10,600	.29	9,200	.39	1,400	.11
Physicians (M.D. and D.O.).....	254,500	6.93	59,100	2.50	195,400	14.93
Chiropractors and therapists.....	54,900	1.50	18,900	.80	36,000	2.75
Medical and dental technicians....	203,600	5.54	140,100	5.93	63,500	4.85
Social and welfare workers.....	15,800	.43	10,600	.45	5,200	.40
Other professional and technical workers.....	213,400	5.81	200,400	8.48	13,000	.99
Managers, officials, and proprietors	94,400	2.57	52,500	2.22	41,900	3.20
Clerical workers.....	596,700	16.25	280,300	11.86	316,400	24.17
Stenographers, typists, and secretaries.....	195,000	5.31	98,100	4.15	96,900	7.40
Bookkeeping workers.....	32,100	.87	18,500	.78	13,600	1.04
Office machine operators.....	5,100	.14	3,500	.15	1,600	.12
Other clerical workers.....	364,500	9.93	160,200	6.78	204,300	15.61

See footnote at end of table.

Table A-1. Estimated Employment in the Medical and Health Services Industry, by Selected Occupation, 1966 - continued

Occupation	Total		Hospitals		Medical and health services other than hospitals	
	Number	Percent	Number	Percent	Number	Percent
Sales workers	1,300	.04	900	.04	400	.03
Craftsmen	87,900	2.39	68,500	2.90	19,400	1.48
Operatives	79,600	2.17	68,500	2.90	11,100	.85
Laundry and dry cleaning operators	44,400	1.21	41,100	1.74	3,300	.25
Other operatives	35,200	.96	27,400	1.16	7,800	.60
Service workers	1,310,200	35.68	1,022,000	43.25	288,200	22.02
Aids, orderlies, and attendents	637,900	17.37	516,500	21.86	121,400	9.27
Cooks	50,700	1.38	37,100	1.57	13,600	1.04
Practical nurses	254,800	6.94	150,100	6.35	104,700	8.00
Janitors and cleaners	79,400	2.16	49,900	2.11	29,500	2.25
Other service workers	287,400	7.83	268,400	11.36	19,000	1.45
Laborers	14,800	.40	10,200	.43	4,600	.35

1/ Includes private wage and salary, government, unpaid family, and self-employed workers in medical and health service establishments as defined by the Standard Industrial Classification Manual, 1957.

NOTE: Because of rounding, the sum of individual items may not equal totals.

Source: U.S. Department of Labor, Bureau of Labor Statistics.

Table A-2. Projected 1975 Employment Requirements in the Medical and Health Services Industry, by Selected Occupation 1/

Occupation	Total		Hospitals		Medical and health services other than hospitals	
	Number	Percent	Number	Percent	Number	Percent
Total, all occupations.....	5,350,000	100.00	3,375,000	100.00	1,975,000	100.00
Professional and technical workers...	2,076,500	38.81	1,218,400	36.10	858,100	43.45
Engineers and natural scientists...	36,400	.68	20,400	.60	16,000	.81
Dentists.....	121,900	2.28	700	.02	121,200	6.14
Dietitians and nutritionists.....	25,100	.47	18,200	.54	6,900	.35
Registered nurses.....	799,200	14.94	593,400	17.58	205,800	10.42
Optometrists.....	19,800	.37	1,000	.03	18,800	.95
Pharmacists.....	11,300	.21	9,400	.28	1,900	.10
Physicians (M.D. and D.O.).....	371,900	6.95	71,500	2.12	300,400	15.21
Chiropractors and therapists.....	86,700	1.62	37,900	1.12	48,800	2.47
Medical and dental technicians.....	376,400	7.04	280,600	8.32	95,800	4.85
Social and welfare workers.....	25,000	.47	13,500	.40	11,500	.58
Other professional and technical workers.....	202,800	3.79	171,800	5.09	31,000	1.57
Managers, officials, and proprietors.	143,900	2.69	76,800	2.27	67,100	3.40
Clerical workers.....	901,200	16.85	398,700	11.81	502,500	25.44
Stenographers, typists, and secretaries.....	295,500	5.52	140,500	4.16	155,000	7.85
Bookkeeping workers.....	43,400	.81	22,600	.67	20,800	1.05
Office machine operators.....	10,600	.20	6,700	.20	3,900	.20
Other clerical workers.....	551,700	10.31	228,900	6.78	322,800	16.34

See footnote at end of table.

Table A-2. Projected 1975 Employment Requirements in the Medical and Health Services Industry, by Selected Occupation - continued

Occupation	Total		Hospitals		Medical and health services other than hospitals	
	Number	Percent	Number	Percent	Number	Percent
Sales workers	800	.02	600	.02	200	.01
Craftsmen	121,600	2.27	90,400	2.68	31,200	1.58
Operatives	95,300	1.78	80,700	2.39	14,600	.74
Laundry and dry cleaning operators	64,400	1.20	58,300	1.73	6,100	.31
Other operatives	30,900	.58	22,400	.66	8,500	.43
Service workers	1,998,700	37.36	1,502,400	44.52	496,300	25.13
Aids, orderlies, and attendants	1,023,900	19.14	819,300	24.28	204,600	10.36
Cooks	55,000	1.03	33,100	.98	21,900	1.11
Practical nurses	398,200	7.44	215,900	6.40	182,300	9.23
Janitors and cleaners	98,100	1.83	55,400	1.64	42,700	2.16
Other service workers	423,500	7.92	378,700	11.22	44,800	2.27
Laborers	12,000	.22	7,000	.21	5,000	.25

1/ Includes private wage and salary, government, unpaid family, and self-employed workers in medical and health service establishments as defined by the Standard Industrial Classification Manual, 1967.

NOTE: Because of rounding, the sum of individual items may not equal totals.

Source: U.S. Department of Labor, Bureau of Labor Statistics.

Table A-3. Estimated Manpower Needs in Selected Health Occupations Resulting from Growth of Employment Requirements and Net Replacements, 1966-75

Occupation	Em-ployment 1966	Employment re-quirements, projected 1975	Manpower needs 1966-75 for		
			Growth and net re-placements	Growth	Net replace-ments 1/
Medical "professions"					
Physicians 2/	295,000	390,000	145,000	95,000	50,000
Dentists	97,500	125,000	45,000	27,500	17,500
Optometrists	17,000	20,000	6,100	3,000	3,100
Podiatrists	8,000	9,600	3,000	1,600	1,400
Nursing					
Aids, orderlies, and attendants	700,000	1,080,000	690,000	380,000	310,000
Professional nurses	620,000	860,000	390,000	240,000	150,000
Licensed practical nurses	300,000	465,000	290,000	165,000	125,000
Other professional and technical					
Pharmacists	120,000	126,000	38,000	6,000	32,000
Medical X-ray technicians	72,000	100,000	51,000	28,000	23,000
Medical laboratory assistants	50,000	100,000	70,000	50,000	20,000
Medical technologists 3/	40,000	75,000	50,000	35,000	15,000
Physical therapists	12,500	27,000	19,500	14,500	5,000
Medical record librarians	12,000	18,000	10,000	6,000	4,000
Occupational therapists	6,500	16,500	13,000	10,000	3,000
Dietitians	30,000	38,000	17,000	8,000	9,000

1/ Net replacements include separations from the labor force because of deaths, retirements, family responsibilities, or other reasons, minus workers qualified in the occupation returning to the labor force.

2/ Includes Doctors of Medicine (M.D.) and Doctors of Osteopathy (D.O.).

3/ Includes workers who require 4 years of post-secondary training or the equivalent in experience.

Source: U.S. Department of Labor, Bureau of Labor Statistics

APPENDIX B. COVERAGE AND METHODOLGY

This appendix details the coverage of the statistics used in the report and describes the methodology used in preparing the estimates of future manpower needs.

Coverage and definitions

This report covers all workers who are engaged in providing the Nation's health care. It includes all workers employed in medical and health services establishments as defined by the Standard Industrial Classification Manual, 1967, and workers in health occupations employed in industries other than the health services.

The Standard Industrial Classification Manual, 1967, describes medical and health service establishments as follows:

THE MAJOR GROUP AS A WHOLE

This major group includes establishments primarily engaged in furnishing medical, surgical, and other health services to persons. Associations or groups primarily engaged in providing medical or other health services to members are included, but those which limit their services to the provision of insurance against hospitalization or medical costs are classified in Major Group 63.

Group No.	Industry No.	
801		OFFICES OF PHYSICIANS AND SURGEONS
	8011	Offices of physicians and surgeons
		Establishments of licensed practitioners having the degree of M.D. and engaged in the practice of general or specialized medicine and surgery. Establishments such as group clinics, in which a group of physicians are associated for the purpose of carrying on their profession, are included in this industry.
802		OFFICES OF DENTISTS AND DENTAL SURGEONS
	8021	Offices of dentists and dental surgeons
		Establishments of licensed practitioners engaged in the practice of general or specialized dentistry.
803		OFFICES OF OSTEOPATHIC PHYSICIANS
	8031	Offices of osteopathic physicians
		Establishments of licensed practioners engaged in the practice of general or specialized osteopathy.
804		OFFICES OF CHIROPRACTORS
	8041	Offices of chiropractors

Establishments of licensed practitioners engaged in the practice of chiropraxis.

806 HOSPITALS

8061 Hospitals

Establishments primarily engaged in providing hospital facilities, and clinics or dispensaries. Institutions such as sanatoria, rest homes, convalescent homes, and curative baths or spas in which medical or surgical services are not a main function of the institution are classified in Industry 8092.

807 MEDICAL AND DENTAL LABORATORIES

8071 Medical laboratories

Medical laboratories providing professional analysis, diagnosis, or treatment services to the medical profession, or to the patient on prescription of the physician.

8072 Dental laboratories

Establishments primarily engaged in making dentures and artificial teeth to order for the dental profession. The manufacture of artificial teeth other than to order is classified in Industry 3843.

809 HEALTH AND ALLIED SERVICES, NOT ELSEWHERE CLASSIFIED

8092 Sanatoria, and convalescent and rest homes

Institutions such as sanatoria, convalescent homes, and rest homes, in which medical or surgical services are not a main function of the institution.

8099 Health and allied services, not elsewhere classified

Establishments engaged in rendering health and allied services, not elsewhere classified. Establishments of registered nurses engaged in the independent practice of their profession are included here, but nurses' registries are classified in Industry 7361. Associations or groups

formed primarily to provide medical or other health service to their members, and which themselves provide these facilities, are included in this industry. Establishments, such as Blue Cross and Blue Shield plans, whose members are supplied these services by independent physicians or hospitals under contract are classified in Industry 6324.

Government medical and health establishments are classified by the Standard Industrial Classification Manual as industry numbers 9180 (Federal Government), 9280 (State Government), and 9380 (local government). In this report government establishments are included with those in private industry according to the industry division described above. For example, Federal Government-operated hospitals are classified under SIC 806.

Health occupations are defined in this report as those whose work is fundamental or unique to the provision of health services, i.e., physician, nurse, orderly. Health manpower, on the other hand, indicates all workers employed in medical and health service establishments whether or not they are in a health occupation, as well as all workers in health occupations employed in other industries.

Methodology

The findings of this report result from a detailed analysis of all available data on employment of health workers and the factors affecting past and current employment needs. The vast body of statistical and other information continually being developed by the Bureau of Labor Statistics as part of the extensive research and statistical collection programs were a primary source of information. Other data were drawn from the collection and analysis programs of the Public Health Service, and from various associations and organizations concerned with health manpower or the provision of health services.

The methodology used to develop projected 1975 requirements was similar to that used in other Bureau of Labor Statistics studies of future occupational needs. In brief, an analysis was made of the factors that affect the demand for workers, and how these factors may affect occupational demand in the future. These factors include the impact of expected change in Federal programs, technology, employer utilization patterns, and patterns of consumer expenditures. A somewhat more detailed discussion of the methodology used to develop occupational projections within the Bureau may be found in America's Industrial and Occupational Manpower Requirements, 1964-75, a report prepared for the National Commission on Automation, Technology and Economic Progress.

APPENDIX C. SELECTED BIBLIOGRAPHY

This bibliography lists a selected group of reports, books, and articles published in recent years on subjects relating to health manpower. Because of space limitations, however, no attempt has been made to include all the many fine studies published.

The selected items are grouped into sections: (I) Health Manpower Statistics; (I) Health Care Statistics; and Wages.

I. HEALTH MANPOWER STATISTICS

A. General

"Hospitals", Journal of the American Hospital Association, August 1, 1966, Part 2.

U.S. Department of Labor

America's Industrial and Occupational Manpower Requirements, 1964-75, Bureau of Labor Statistics, January 1966.

Employment and Earnings Statistics for the United States, 1909-66, Bureau of Labor Statistics, Bulletin 1312-4, December 1966.

Health Careers Guidebook, Bureau of Employment Security, 1965.

Occupational Outlook Handbook, 1966-67 Edition, Bureau of Labor Statistics, Bulletin 1450, 1965.

Projections 1970, Bureau of Labor Statistics, Bulletin 1536, 1966.

Technology and Manpower in the Health Service Industry, 1965-1975, Office of Manpower Policy, Evaluation, and Research, 1967.

U.S. Department of Health, Education, and Welfare

Employees in Nursing and Personal Care Homes, United States, May-June 1964, Vital and Health Statistics Series, Public Health Service, National Center for Health Statistics, Series 12, Number 5, September 1966.

Health Manpower Perspective: 1967, Bureau of Health Manpower, Public Health Service. (In Press)

Health Manpower Source Book, Section 17, Industry and Occupation Data from 1960 Census, by State, Public Health Service, 1963.

Health Manpower Source Book, Section 19, Location of Manpower in 8 Occupations, Public Health Service, 1965.

Health Resources Statistics: 1965, Public Health Service, Publication 1509,1966.

B. Occupational

Dentists

Dental Students' Register, American Dental Association, 1965-66 and prior annual issues.

Distribution of Dentists in the United States by State, Region, District and County, American Dental Association, 1966 and prior annual issues.

"Number of Dental Graduates Required Annually to 1985", The Journal of the American Dental Association, September 1965, pp. 694-698.

Nurses

Facts About Nursing, American Nurses' Association, 1966 Edition.

U.S. Department of Health, Education, and Welfare

Health Manpower Source Book, Section 2, Nursing Personnel, Public Health Service, Revised January 1966.

Nurses in Public Health, Public Health Service, January 1964.

Occupational Health Nurses, An Initial Survey, Public Health Service, May 1966.

Toward Quality in Nursing, Needs and Goals, Report of the Surgeon General's Consultant Group on Nursing, Public Health Service, February 1963.

Optometrists

"1964 Economic Survey", Journal of the American Optometric Association, April 1966, May 1966, June 1966, July 1966, August 1966, September 1966, and October 1966.

Osteopathic physicians

A Statistical Study of the Osteopathic Profession, American Osteopathic Association, issued annually.

Physicians

American Medical Association

A.M.A. Directory Report Service: Quarterly Tables of Distribution of Physicians, by Type of Practice, issued quarterly.

Directory of Approved Internships and Residencies, issued annually.

Distribution of Physicians, Hospitals, and Hospital Beds in the U.S. by Census Region, State, County, and Metropolitan Area, 1966.

Physicians for a Growing America, Report of the Surgeon General's Consultant Group on Medical Education, Public Health Service, Publication No. 709, October 1959.

Podiatrists

"1964 Survey of the Podiatry Profession by the Special Studies Division, American Podiatry Association", Journal of the American Podiatry Association, 1965, Reprint No. 1:66:01.

Miscellaneous

National Conference on X-ray Technician Training, Public Health Service, 1966.

The Psychiatric Aide in State Mental Hospitals, Public Health Service, 1965.

Resources for Medical Research: Manpower for Medical Research Requirements and Resources, 1965-1970, Public Health Service, Report No. 3, January 1963.

II. HEALTH CARE STATISTICS

A. Expenditures

Report of the Commission on The Cost of Medical Care, Volumes I, II, III, and IV American Medical Association, 1963 and 1964.

Source Book of Health Insurance Data, 1966, Health Insurance Institute, 1967.

U.S. Department of Health, Education, and Welfare

A Report to the President on Medical Care Prices, February 1967.

The Extent of Health Insurance Coverage in the United States: Research Report No. 10, Social Security Administration, July 1965.

Health Insurance Coverage, United States, July 1962-June 1963, Public Health Service, National Center for Health Statistics, Series 10, Number 11, August 1964.

Health Insurance: Type of Insuring Organization and Multiple Coverage, United States, July 1962-June 1963, Vital and Health Statistics Series, Public Health Service, National Center for Health Statistics, Series 10, Number 16, April 1965.

"National Health Expenditures, 1950-65", Social Security Bulletin, February 1967, pp. 3-13.

Personal Health Expenses, Distribution of Persons by Amount and Type of Expense, United States: July-December 1962, Vital and Health Statistics Series, Public Health Service, National Center for Health Statistics, Series 10, Number 22, September 1965.

Personal Health Expenses, Per Capita Annual Expenses, United States: July-December 1962, Vital and Health Statistics Series, Public Health Service, National Center for Health Statistics, Series 10, Number 27, February 1966.

B. Type, frequency, and other characteristics of care

U.S. Deapartment of Health, Education, and Welfare, Vital and Health Statistics Series.

Acute Conditions, Incidence and Associated Disability, United States, July 1961-June 1962, Public Health Service, National Center for Health Statistics, Series 10, Number 1, May 1963.

Acute Conditions, Incidence and Associated Disability, United States, July 1962-June 1963, Public Health Service, National Center for Health Statistics, Series 10, Number 10, June 1964.

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Acute Conditions, Incidence and Associated Disability, United States, July 1964-June 1965, Public Health Service, National Center for Health Statistics, Series 10, Number 26, December 1965.

Age Patterns in Medical Care, Illness, and Disability, United States, July 1963-June 1965, Public Health Service, National Center for Health Statistics, Series 10, Number 32, June 1966.

Characteristics of Patients of Selected Types of Medical Specialists and Practitioners, United States, July 1963-June 1964, Public Health Service, National Center for Health Statistics, Series 10, Number 28, May 1966.

Dental Care, Volume of Visits, United States, July 1957-June 1959, Health Statistics from the U.S. National Health Survey, Public Health Service, Series B-No. 15, April 1960.

Family Income in Relation to Selected Health Characteristics, United States, Public Health Service, National Center for Health Statistics, Series 10, Number 2, July 1963.

Medical Care, Health Status, and Family Income, United States, Public Health Service, National Center for Health Statistics, Series 10, Number 9, May 1964.

Persons Hospitalized by Number of Hospital Episodes and Days in a Year, United States, July 1060-June 1962, Public Health Service, National Center for Health Statistics, Series 10, Number 20, June 1965.

Volume of Physician Visits, United States, July 1957-June 1959, Health Statistics from the U.S. National Health Survey, Public Health Service, Series B-No. 19, August 1960.

Volume of Physician Visits by Place of Visit and Type of Service, United States, July 1963-June 1964, Public Health Service, National Center for Health Statistics, Series 10, Number 18, June 1965.

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U.S. Department of Labor

Earnings and Supplementary Benefits in Hospitals, Mid-1960, Bureau of Labor Statistics, Bulletin 1294, May 1961.

Industry Wage Survey, Hospitals, Mid-1963, Bureau of Labor Statistics, Bulletin 1409, June 1964.

Industry Wage Survey, Hospitals, July -1966, Bureau of Labor Statistics, Bulletin 1553, 1967.

Industry Wage Survey, Nursing Homes and Related Facilities, April 1965, Bureau of Labor Statistics, Bulletin 1492, April 1965.

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State Salary Ranges, Division of State Merit Systems, issued semiannually.

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