DOCUMENT RESUME

ED 036 610 08 VT 007 757

AUTHOR TEEPLE, JOHN
TITLE IMPLICATIONS OF CAREER OPENINGS IN HEALTH OCCUPATIONS FOR PRIORITIES IN VOCATIONAL-TECHNICAL EDUCATION. WORKING PAPER.
INSTITUTION NATIONAL PLANNING ASSOCIATION, WASHINGTON, D.C. CENTER FOR PRIORITY ANALYSIS.
SPONS AGENCY OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C.
BUREAU NO BR-8-0643
PUB DATE OCT 68
GRANT OEG-0-8-080643-4467(085)
NOTE 51P.

EDRS PRICE EDRS PRICE MF-$0.25 HC-$2.65
DESCRIPTORS COMMUNITY COLLEGES, CORE CURRICULUM, *EDUCATIONAL NEEDS, *EDUCATIONAL PLANNING, EMPLOYMENT PROJECTIONS, EMPLOYMENT TRENDS, *HEALTH OCCUPATIONS EDUCATION, *HEALTH SERVICES, INTERAGENCY COOPERATION, *MANPOWER NEEDS, OCCUPATIONAL MOBILITY

ABSTRACT

THE IMPLICATIONS OF THE PURSUIT OF HEALTH GOALS IN THE 1970'S ARE DISCUSSED TO DETERMINE PRIORITIES IN VOCATIONAL-TECHNICAL EDUCATION. FACTORS BASIC TO INCREASING THE NATIONAL EMPHASIS ON HEALTH IN THE 1970'S ARE OUTLINED. AN INCREASED DEMAND FOR HEALTH SERVICES ARE CHANGES IN THE HEALTH FIELD AND HEALTH OCCUPATIONS TRAINING WILL AFFECT THE SUPPLY OF HEALTH MANPOWER. THE FOLLOWING AGENDA OF PRIORITIES FOR PLANNING AND RESEARCH IN VOCATIONAL-TECHNICAL EDUCATION IS SUGGESTED: (1) PROGRAM DEVELOPMENT FOR NON-PROFESSIONAL HEALTH OCCUPATIONS, (2) EXPANSION OF ASSOCIATE DEGREE NURSING AND PRACTICAL NURSE PROGRAMS, (3) INCREASING THE REPRESENTATION OF THE "LEFT OUT" GROUPS IN HEALTH OCCUPATIONS EDUCATION, (4) CLOSER COORDINATION BETWEEN VOCATIONAL EDUCATION AND COMMUNITY HEALTH CENTERS, (5) OFFERING OF CORE CURRICULUM IN HEALTH ON THE 11TH AND 12TH GRADE LEVELS, AND (6) COOPERATION BETWEEN VOCATIONAL EDUCATION AND PUBLIC AND PRIVATE AGENCIES TO ASSESS LOCAL MANPOWER SITUATIONS. (JK)

Implications of Career Openings in Health Occupations for Priorities in Vocational-Technical Education

Working Paper

prepared by

John Teeple
Center for Priority Analysis
National Planning Association

for

U.S. Office of Education
Grant No. OEG-0-8-080643-4467(085)

October, 1968

INTRODUCTION

Decreasing the gap between the potentialities of the modern health technologies and the availability of medical care to Americans is an important national objective. To achieve this objective, and also to allow for greater demands arising out of population growth in the next decade, would involve a large-scale increase in expenditures for medical care and in the manpower needed in many occupations to provide health services. To illustrate the significance of the greater demands for health services, the National Planning Association has "priced out" the dollar costs and manpower requirements for achieving national goals in health in the coming decade. This working paper has been prepared by NPA's Center For Priority Analysis to indicate the probable implications of the pursuit of health goals in the 1970's for assessing priorities in vocational-technical education.

There are four major factors which lead us to expect an increasing national emphasis on priorities in health in the 1970's. First, our highly effective industrial economy has, through the growth of urban areas and means of transportation, brought in its wake a series of health hazards unforseen a generation ago. Second, the pressures are increasing, due in part to our greater social consciousness, for a more equal distribution of health services. Third, population growth means that a larger number of persons, especially older persons, will have access to more adequate medical care in the 1970's because of already established Federal programs

such as Medicare and Medicaid. Finally, advances in medical science are improving our ability to prevent, diagnose, and treat many more illnesses than was the case a decade or two ago. These forces are strategic in forming the nation's emerging objectives in health.

The standards for NPA's health goal reflect what most persons would consider as desirable or necessary improvements. All told, attaining goals in health is estimated to involve an increase in spending for health and medical care rising from the $34 billion spent in 1962 to $90 billion by 1975 (in 1964 prices).(1) Growth in health expenditures of this magnitude would provide all families with a level of health care equal to that currently available to families with the most comprehensive health insurance coverage, plus expanded provision for dental and psychiatric care. Achieving goals in health is also expected to entail public expenditures of $7 billion a year to finance medical care for the aged, a tripling of spending for medical research, and an additional $6 billion of capital outlays for medical facilities, largely for nursing homes and hospitals.

Growth in private and public expenditures for health of these dimensions would have far-reaching implications for manpower needs at a variety of skill levels. In 1962, spending for health services and facilities generated employment for nearly 3 million persons. If our society were to assign a high priority to achieving objectives in health, manpower needs related to health could double to approximately 6 million by 1975.(2) While these

---

(1) Lecht, Leonard L., Manpower Requirements for National Objectives in the 1970's, Report to the Manpower Administration, U.S. Department of Labor, Table 2-2, p. 56, 132.

(2) Ibid., Table 6-2, p. 133.

needs include requirements for large numbers of professional workers such as nurses and physicians, supplying medical care also creates employment for many less skilled workers such as medical technicians, clerical workers, cooks, and nurses' aides. To achieve national goals in health in the mid-1970's would require the employment of more than 2.3 million workers performing direct health services as non-professional technicians, assistants, practical nurses, aides, or similar capacities. The bottlenecks along the path toward attaining objectives in health are as likely to be in the training of manpower, both professional and non-professional, as in the securing of funds.

Vocational-technical education can play a critical role in assuring a supply of trained manpower in health-related fields in the 1970's. The dimensions of this challenge are underscored by the projections of annual career openings for over 80,000 nurses' aides, and nearly 50,000 practical nurses over the coming decade. It would be difficult to meet manpower needs of this scope without creating many more training and employment opportunities for persons from economically and socially disadvantaged groups.

Avoiding bottlenecks in the health occupations in the next ten or fifteen years will involve a large-scale expansion in vocational and technical programs related to medical care in high schools and junior colleges. Designing programs to meet future needs will require more emphasis on one- and two-year postsecondary nursing programs, in-service training

for occupational upgrading, and the development of core curricula on the secondary level to increase the options available to young persons planning to enter the health fields.

Not only will there be a significant expansion in numbers trained, but the jobs in the health fields are changing as are the levels and methods of training. Developments in health delivery services, occupational structure, and health occupations training are briefly reviewed in the next section. Following this is a discussion of career openings in the health service fields in the 1970's, and the priorities these openings imply for vocational-technical education.

TRENDS IN MANPOWER REQUIREMENTS FOR HEALTH

The last thirty years has seen a revolution in health care characterized by the growth in both size and complexity of health service dispensing units. The family doctor with one or more assistants is no longer the primary dispensing unit in health care. He is being replaced either by multi-physician clinics employing a number of nurses and technicians or by services provided in outpatient clinics of general purpose hospitals. Between 1959 and 1962, there was an increase of 10,000 doctors in private practice who also engaged in group practice. (3) Hospitals themselves have grown larger. Although special purpose institutions for mental health, cancer, and research still exist, the typical large city or community hospital provides a broad range of medical specialties to serve the ill. Such integration of medical services provides a health supermarket, as it were, for all those who can travel to the store.

The low-income groups in the inner city have not participated as have the suburbs in this growth in clinics and general purpose medical institutions. New trends are apparent in the development of community health centers, designed as "outreach" functions of major hospitals to bring the best in medical services for health screening and diagnosis, and health education and other prevention measures to the neighborhoods. These neighborhood health centers will provide an expanding opportunity for new subprofessional occupations, such as the community and family health aide.

---

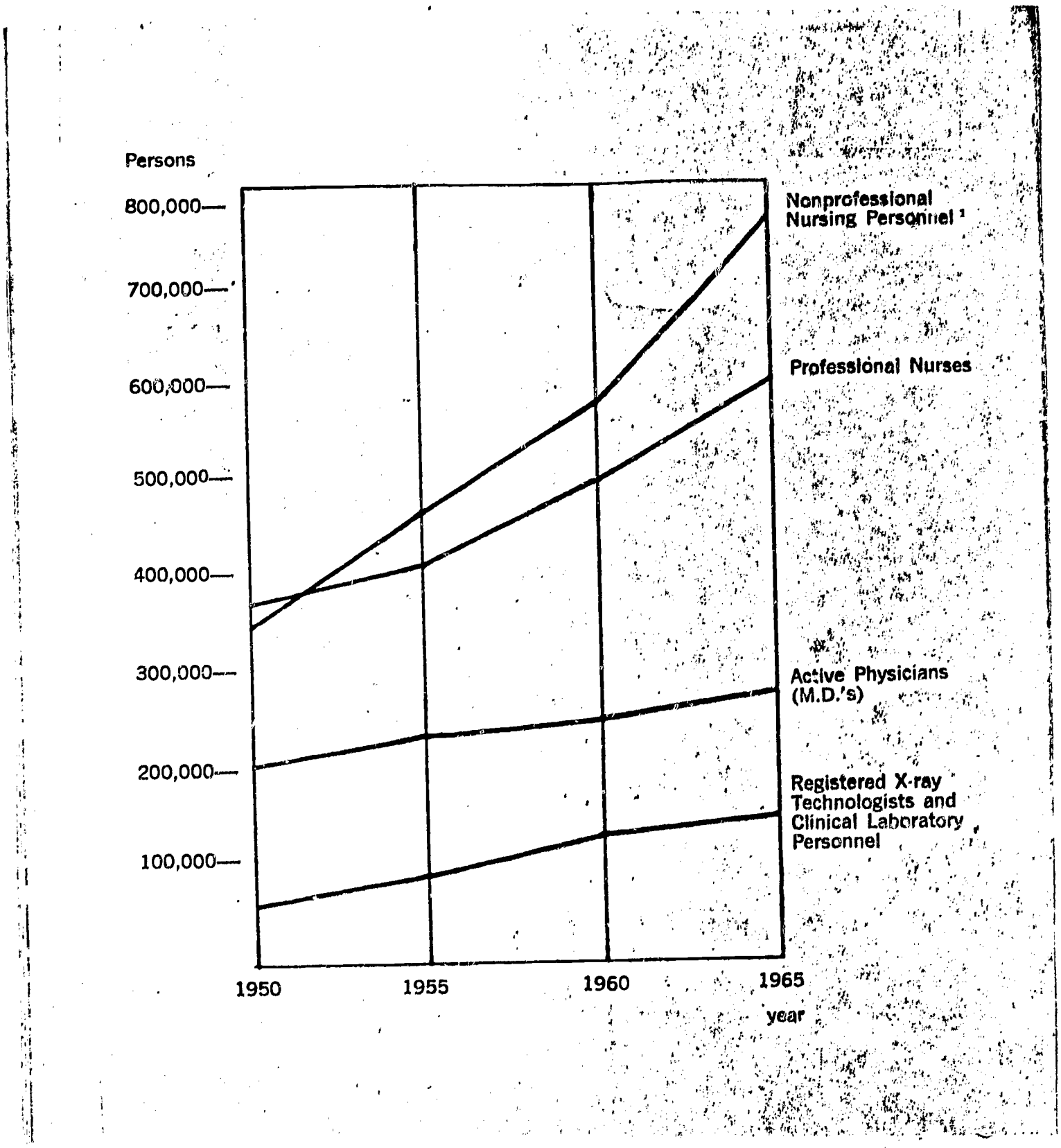
(3) Health Manpower: Action to Meet Community Needs, Report of the Task Force on Health Manpower, National Committee on Community Health Services, 1967, p. 71.

The occupational structure accompanying this change in health delivery systems is characterized by two major trends - substitution of non-professionals for professionals and specialization. These trends have resulted in the rapid growth of non-professional service occupations and the development of many technical specialists. Both developments are responses to shortages of professional manpower, are influenced by advancing technology, and are accompanied by occupational professionalism, licensing and inter-occupational rivalries. The great strides in health care in the past generation have taken place with only minor changes in the ratio of physicians to population, and this ratio has remained at close to 130 physicians (M.D.'s) per 100,000 population since at least 1920. The professional and non-professional nursing occupations, and the technical and laboratory occupations, have grown at a much faster rate than physicians. (See Figure 1.) For example, there were about four people in the nursing occupations for every physician in 1950. That rate has grown to 6 to 1 today. Auxiliary medical and health services personnel, e.g., nursing aides, are increasing at a much more rapid rate than the growth in number of physicians, and it is expected that this trend will continue. Similarly, changes in concepts of health care have resulted in rapid expansion in a number of allied health occupations. Health educators doubled in number between 1950 and 1962, rehabilitation therapists increased fourfold as have occupational therapists. Clinical psychologists in health settings increased from 3,000 in 1950 to 8,500 in 1962. (4)

---

(4) Health Manpower, op. cit., pp. 47, 48.

FIGURE 1
TRENDS IN THE SUPPLY OF MEDICAL MANPOWER, 1950 TO 1965



(1) Practical Nurses in Practice and Employed Aides, Orderlies and Attendants.

Note: See Appendix Table 2 for details on future trends.

Source: Report of the National Advisory Commission on Health Manpower, U.S. Government Printing Office, 1967, p. 8.

Occupational substitution, the downward transfer of functions in the health services professions, is the natural result of manpower shortages among physicians and professional nurses. While shortage of physicians is due, in large part, to a lack of training facilities and the costs of preparation for this profession, the shortage in professional nursing can be traced to poor working conditions and earnings relative to other occupations. A nurse, requiring two to four years of training frequently earns less than a stenotypist who receives her training in one year. In addition, the nurse often must work odd hours, often without weekends off. These conditions make the occupation of nursing less attractive. Evidence of this fact is that there are more than 100,000 budgeted but unfilled positions for nurses. Some training slots are not filled, and the turnover of employed nurses is 60 percent per year. (5) In the face of these shortages and in spite of vacant jobs, more than 280,000 registered nurses (RNs) were not in the labor market in 1962. (6)

Hospitals react to these shortages by assigning tasks normally performed by RNs to licensed practical nurses (LPNs) or to nurses' aides when RNs are not available. Although an adequate level of patient care requires "50 percent of the nursing staff to be RNs and only 20 percent nurses' aides," in some hospitals up to 80 percent of the direct nursing services are performed

---

(5) Training Health Service Workers, Proceedings of the Department of Labor-HEW Conference on Job Development and Training for Workers in Health Services, 1966, p. 23.

(6) The Nation's Nurses-Inventory of Professional Registered Nurses, American Nurses' Association, 1965, p. 23.

by nurses' aides. (7) Similarly, many practical nurses are performing functions such as irrigations, injections and mixing intraveneous solutions, previously reserved for registered nurses. (8) Such practices emphasize the need either for better training at lower occupational levels or a more rational definition of the entire occupational structure.

The advances in technology in the form of new medical equipment, new types of patient monitoring, diagnostic and treatment devices, and the increasing use of laboratory tests in diagnosis have contributed to the use of substitute personnel as well as to specialization in the health service occupations. Employment of specialized clinical laboratory personnel, for example, increased from 30,000 in 1950 to 85,000 in 1966. The growth in computer applications in the health industry has, in turn, helped to take over some of the routine record keeping tasks of both physician and nurse. This has also created new jobs for programmers and computer operators in the health service industry who now perform tasks once considered part of the nurses' job.

The trends in the changing occupational pattern appear to be as follows: new medical advances require new procedures which are at first assigned to the professional nurse. At the same time, the professional nurse is required to take over more and more teaching and administrative functions, such as supervising practical nurses and nurses' aides. The increasing use of

---

(7) Technology and Manpower in the Health Service Industry, U.S. Department of Labor, 1955-75, p. 21.

(8) The LPN, Who She Is, Where She Works, What She Does, published by the Licensed Practical Nursing Association.

technology results in the introduction of assistants in the form of medical technicians and laboratory personnel who specialize in diagnostic tests and monitoring tests and equipment. More and more of the bedside patient service is taken over by nurses' aides or practical nurses, and the record-keeping and housekeeping functions are assigned to other assistants. Finally, the most routine tasks come to be performed by automatic data systems.

The same pattern of occupational specialization has developed in the medical and clinical laboratory. New laboratory tests and equipment are usually developed and used by doctors. As their use becomes more common, medical assistants take over these laboratory functions and specialize in the tests which are frequently performed. Increased routinization of these procedures results in their automation so that one laboratory technician can then perform a large number of tests. These trends in occupational substitution and specialization result in the appearance of a number of new occupations. Many of these are so new that only fragmentary employment data are available. The emerging occupations are being developed in the health industry in response both to changes in technology and in health service delivery system. Most of them have been developed as a response to shortages in physicians and nurses rather than through a conscious modification of old jobs. Other new occupations, such as therapists' aides and other mental health specialists, have also been developed through ad hoc responses to needs rather than through a rational application of job analysis techniques.

Although there are many new occupations developing in the health service field, there are, as yet, few "new careers", if these are to be defined as a progressive series of positions of increasing responsibility, remuneration and status. (9) To a considerable degree, the health field is still characterized as a series of closed occupations. (10)

It is reasonable to expect that many of the new occupations in the health field will encounter, to one degree or another, the same types of professionalism and insistence upon strict educational requirements as their predecessors. However, the shortages of trained personnel in health can be expected to constitute a major force in easing the established institutionalized resistances to assuring job security and career lines in the newly emerging health occupations. The recent experimental federally funded community health programs, for example, provide for the creation of new sub-professional jobs which may become associated with institutional procedures for job advancement. A number of new careers in health are likely to be combinations of old occupations developed through the removal of existing barriers to vertical mobility. Yet, compared with recent innovations in other areas such as the social welfare field, vertical mobility in the health occupations will probably be slow to develop in the coming decade.

---

(9) The Health Careers Guidebook lists over 200 occupations. Many, however, are specializations within an occupation or auxiliary health personnel in maintenance, laundry service, food preparation and other supportive functions. About 50 occupational titles are relevant for vocational-technical education and they are reported in Appendix 2.

(10) Within the Registered Nurse category, the nurse with a two-year Associate Degree (what the American Nurse Association refers to as a "technical nurse") can rarely use the academic credits or subsequent experience in lieu of a full four-year academic preparation as a professional nurse - even though she passes the same state licensing exam upon graduation from a two-year program. Indeed, the licensing requirements themselves serve as a barrier to progress in developing new occupations. The average state licensing law dates from 1915. Proceeding from LPN or Nurses' Aide to a position as a certified RN is even more difficult for similar reasons.

MANPOWER FOR HEALTH IN THE 1970's

Occupational Growth Patterns

Providing the health services involved in attaining goals in health in the coming decade is expected to require the employment of some 6 million persons by 1975. Over 4 million of this total would represent employment in occupations with a specific health-oriented content such as physicians, medical technicians, or practical nurses. Less than 2 million persons would be working in occupations which are important for health and also in many other areas. These would include building trades workers engaged in hospital construction, clerical workers in medical centers, and a variety of service and maintenance workers. The analysis of health manpower needs in this report concentrates on the occupations which are directly involved in providing health services.

The occupations which are specific to health can be summarized in terms of the standard Census occupational classifications. They can also be considered in terms of other classifications which are frequently more directly related to program planning in vocational-technical education. Since the Census categories provide a useful overview of expected developments in health manpower, employment projections largely derived from Census sources are presented first in Table 1. (See page 13.)

TABLE 1

Estimated Growth in Employment in Health-Related Occupations, 1962 to 1975 (a)

Occupation	Employment (in 000) in 1962	Employment (in 000) Projection for 1975 (b)	Per Cent Increase, 1962 to 1975
Professional and Managerial	1,105	1,969	78%
Dentists	81	149	84
Medical Librarians	8	11	38
Medical Social and Welfare Workers	11	37	236
Pharmacists	125	163	30
Physicians (c)	238	402	69
Professional Nurses	591	1,091	85
Professors and Teachers	12	22	83
Salaried Managers and Administrators	39	94	141
Other	977	2,327	138
Dental Assistants	69	127	84
Dental Lab Technicians	25	44	76
Hospital Attendants, including Nurses' Aides	458	1,229	168
Medical and Dental Technicians	171	352	106
Practical Nurses	254	575	126
Total	2,082	4,296	106

(a) Derived from Manpower Requirements for National Objectives, op. cit; Appendix Table 25-3; and Occupational Outlook, U.S. Dept. of Labor, 1963--1964.
(b) Refers to projections for achieving health goal.
(c) M.D. Physicians only.

Note: Detail may not add to totals due to rounding.

Attaining goals in health is estimated to increase employment in health-related occupations by 2.2 million, an increase of over 100 percent beyond 1962 levels. The traditional health professions, i.e., doctors, dentists, professional nurses, are projected to increase by less than the overall average. The largest percentage growth is listed for the non-professional occupations, such as hospital attendants, practical nurses, and for hospital administrators and managers. The one exception is the relatively small group of medical social workers, the occupation with the largest single projected percentage growth. Medical and dental technicians are expected to increase at a rate closely approximating the growth rate for the entire group. The occupation with the largest amount of increase is the hospital attendants. This category includes most of the emerging subprofessional human service health occupations such as nurses' aides and psychiatric aides.

Physicians and professional nurses in the coming decade, as in the recent past, can be expected to constitute the bottleneck occupations for the health goal. While the percentage increase anticipated for physicians is a modest one, 69 percent, this represents a growth in requirements for some 165,000 physicians. The estimate for physicians implies an average increase in employment for physicians of 12,500 a year between 1962 and 1975. An additional 5,500 physicians would probably be needed to replace losses due to normal attrition. According to the U.S. Public Health Service, it is likely that American medical schools will graduate some 8,750 new M.D.'s annually in the next decade, or about half of the number needed to meet demands

arising from growth in employment and attrition losses.(11) The Public Health Service also projects an increase in the supply of professional nurses amounting to about 20,000 a year in the 1965 to 1970 period.(12) Comparable percentage increases between 1970 and 1975 would add an average of 23,000 a year to the supply. This compares with expected requirements due to employment growth alone amounting to 38,000 a year.

Shortages of physicians and nurses are likely to provide the impetus to rapid growth in job opportunities in other health occupations requiring lesser amounts of education and training. To indicate the career potentials in the occupations which are relevant for vocational-technical education, Table 2 indicates the anticipated career openings for a list of more detailed occupations in which vocational preparation is frequently received in high school or junior college. (See page 16.) The projections refer to job openings created by employment growth and also by normal attrition.

The bulk of the career openings in the occupations in Table 2 are for professional nurses, nurses' aides and other attendants. Between them, the three occupations are expected to account for an average of 200,000 job openings a year in the 1962 to 1975 period. While the various technician occupations offer the prospect of good earnings and growth in opportunities, they are projected to provide a considerably lesser number of career openings, and average of about 32,000 a year. All told, the occupations listed in Table 2,

---

(11) Health Manpower Source Book, Manpower in the 1960's, op. cit., p. 38.

(12) Ibid., p. 65.

TABLE 2

Estimated Career Openings in Selected Health Occupations, 1962 to 1975

Occupation	Projected Growth in Employment, 1962 to 1975 (a) (in 000)	Annual Attrition Rate (b)	Total Career Openings 1962 to 1975 (c) (in 000)	Annual Average Career Openings, 1962 to 1975 (in 000)
Dental Assistants	58	3.2%	98	7.6
Dental Lab Technicians	19	2.7	31	2.4
Hospital Attendants (including Nurses' Aides)	771	3.2	1,122	86.3
Medical and Dental Technicians	181	2.7	273	21.0
dental hygienists	23		30	2.4
medical technicians	37		55	4.2
X-ray technicians	64		97	7.4
other technicians	57		91	7.0
Practical Nurses	321	3.9	634	48.8
Professional Nurses	500	3.2	850	65.4

(a) It is likely that shortages of nurses and physicians would lead to greater than anticipated increases for practical nurses and medical technicians.

(b) NPA estimate.

(c) Average employment between 1962 and 1975 multiplied by average annual attrition rate produces estimated average annual replacement demand. This figure multiplied by 13 (years) provides an estimate of total replacement demand 1962 - 1975. Adding total replacement demand to total adjusted employment growth provides an estimate of total career openings (actual jobs open) during the 13-year period.

Note: Details may not add to totals due to rounding.

because of their relevance for vocational-technical education, are expected to create over 230,000 job openings annually in the coming decade.

The Challenge to Vocational-Technical Education

In some areas the role of the vocational education system in supplying training for the occupations in Table 2 is already large. Practical nurses are an example. In other areas meeting the challenge of growing career opportunities in health fields will involve introducing new vocational education programs and expanding many existing ones. The associate degree program for nurses is an instance.

It is difficult to translate projections of job openings into training requirements for the high school and junior college vocational education systems. Occupational preparation for the non-professional health occupations is provided in a variety of settings including the federally funded vocational programs in the schools, in proprietary schools and the armed forces, through on-the-job training, and, recently, in the job training activities conducted under the auspices of the Manpower Development and Training Act. Completion of vocational education programs in areas related to the occupations in Table 2 provides a useful, if limited, indication of the role of the federally-supported vocational education system in training for the health occupations. This information is presented in Table 3. (See page 18.)

TABLE 3

Role of the Vocational Education System in Occupational Preparation in Selected Health Occupations[a]

Occupation	Major Level of Vocational Education	Estimated Average Annual Career Openings, 1962 to 1975	Vocational Education Courses Completed in Fiscal Year, 1967[c]
Dental Assistants	Secondary	7,600	2,300
Dental Lab Technicians	Post-Secondary	2,400	400
Medical and Dental Technicians	Post-Secondary	21,000	2,900
Hospital Attendants (Nurses' Aides)	Secondary	86,300	5,000
Practical Nurses	Post-Secondary	48,800	25,300
Professional Nurses[b]	Post-Secondary	65,400	2,900

(a) For further detail, see Appendix Table 3.

b) Refers to Associate Degree program for nurses.

(c) Estimates derived from reports of state boards of vocational education. These reports provide an incomplete coverage of vocational education programs, especially at the post-secondary level. For the adjustments made, see Appendix Table 3. Completion estimates refer to federally-supported vocational-technical education programs.

The largest number of completions in fiscal year 1967 were in courses training persons to become practical nurses, usually licensed practical nurses. This was the one health occupation in which the course completions in fiscal year 1967 amounted to more than half the estimated average annual career openings in the 1962 to 1975 period. The vocational education courses were also significant in preparing persons to become dental assistants. In the other occupations listed, the vocational-technical education system plays a minor role with completions relatively small, as compared with the anticipated career openings. There were no course completions in fiscal year 1967, for example, in new medical technology fields

such as histology technicians or inhalation therapy technicians. These gaps indicate the scope of the challenge to vocational education in planning to meet health manpower needs in the 1970's.

Completions, by themselves, are an inadequate measure of the occupational preparation received through the vocational education system. Some of the students who enroll in the health courses but do not complete them go on to further training in other types of schools or by taking entrance level jobs in which they receive advanced training. Enrollments in the vocational-technical education programs related to health were typically several times greater than the completions because programs lasted for more than a single year and because of dropouts. For example, in the vocational program for practical nurses -- the curriculum with the largest single enrollment, over 60,000, the number of students completing the program in 1967 was approximately 25,000.

For many purposes, such as curriculum development, planning in vocational education is concerned with more narrowly defined occupational specialties than those listed in Tables 1 to 3. Both obstetrical technicians and radiation monitors, for example, are included under the heading of "medical technicians". Yet the two occupations require different types of vocational-technical training to qualify for entrance. The more detailed nonprofessional health specialties are better indicated by the Dictionary of Occupational Titles job classifications than by the standard occupational categories largely drawn from Census sources. Accordingly, the occupational titles in Table 3 have been converted into the D.O.T. occupations to which

they refer. This conversion is presented in Table 4. (See page 21.) The specialties presented are indicative of the range of occupations at least potentially of interest to vocational education rather than as an exhaustive list.

Many of the health-related specialties in Table 4 are the newly emerging occupations, and they include a number of fields in which technological change, or shortages of physicians and professional nurses, can be expected to create many new career opportunities, or to upgrade existing jobs. The advent of nuclear energy for peaceful or military uses has created the occupational category of nuclear medical technician and radiation monitor. Developments in medical technology have created career opportunities for specialists such as electroencephalographic technicians and electrocardio technicians. An acute shortage of professional personnel in the mental health occupations has upgraded the duties of the psychiatric aide from routine custodial care to participation, in many mental health centers, in the institutional programs of therapy and rehabilitation. Currently, for example, the bulk of patient care in state and county mental hospitals is provided by an estimated 100,000 psychiatric aides who are employed in these facilities.(13)

---

(13) Lynton, Edith F., The Subprofessional: From Concepts to Careers, National Committee on Employment of Youth, 1967, p. 69.

TABLE 4

Conversion of Standard Job Titles to
Dictionary of Occupational Titles Classifications

Standard Occupational Classification	D.O.T. Occupational Code	D.O.T. Occupational Title	Average Annual Career Openings 1962 to 1975
Dental Assistants	078.378	Dental Assistant	7,600
Dental Lab Technicians			2,400
	712.381	Molder Bench	
	712.381	Set-up Man	
	712.381	Contour-wire specialist	
	712.381	Dental Ceramist	
Medical and Dental Technicians			21,000
	078.281	Cytotechnologist	
	078.281	Biochemistry Technician	
	078.281	Hematology Technician	
	078.368	Electroencephalographic Technician	
	078.368	Electrocardio Technician	
	078.368	Dental Hygienist	
	078.368	X-Ray Technician	
	078.378	Obstetrical Technician	
	078.381	Tissue Technician	
	078.381	Medical Laboratory Assistant	
	078.381	Nuclear Medical Technician	
	079.368	Inhalation Therapy Technician	
	079.378	Surgical Technician	
	199.187	Radiation Monitor	
	712.884	Orthopedic Technician	
Hospital Attendants			86,300
	079.368	Medical Assistant	
	354.878	First Aid Attendant	
	354.878	Home Attendant	
	355.878	Psychiatric Aid	
	355.878	Orderly	
	355.878	Cottage Parent	
	355.878	Nurses' Aid	
	355.878	Physical Therapy Attendant	
	355.878	Ambulance Attendant	
	355.878	Emergency Entrance Attendant	

Standard Occupational Classification	D.O.T. Occupational Code	D.O.T. Occupational Title	Average Annual Career Openings 1962 to 1975
Practical Nurses			48,800
	079.373	Licensed Practical Nurse	
	354.878	Practical Nurse	
	354.878	Midwife	
Professional Nurses			65,400
	075.378	Anesthetist	
	075.378	General Duty Nurse	
	075.378	Nurse-Midwife	
	075.378	Private Duty Nurse	
	075.378	Staff Nurse	
	075.378	Occupational Health Nurse	

Vocational Education for Nonwhites in the Health Occupations

Greater national concern with poverty and inequality, and especially the inequality based on race, will figure as a strategic force in shaping vocational-technical education in the coming decade. Both the Vocational Education Act of 1963 and the new legislation enacted in 1968 reflect this concern. Career openings in the nonprofessional health occupations can offer an important opportunity for many persons from economically and socially disadvantaged groups to obtain employment and, frequently, to increase their income. The extent to which these potentials are realized in the 1970's will be significantly affected by the development of career ladders in occupations such as nurses' aides. In turn, the degree to which the nation succeeds in employing its underutilized and unutilized human resources will be a major element in determining our ability to provide the manpower to implement national priorities in health.

The possibilities for creating career opportunities in the health occupations are especially significant for nonwhites. Since World War II, their unemployment rate has typically been double the national average. In the prosperity year 1967, the unemployment rate among nonwhite teenagers ranged, varying with age and sex, from 20 to 32 percent. This compares with a national rate of 3.8 percent. (14)

---

(14) Manpower Report of the President, 1968, Table A-13, p. 237.

Increasing employment opportunities for nonwhites in the health fields can be expected to involve both special job training and remedial education programs for adults, and a greater representation of nonwhites in high school and junior college vocational-technical education programs. Many of the opportunities which are likely to offer these career openings are being developed with federal support as part of the "new careers" program. The new careers concept refers to developing new occupations, i.e., new sets of tasks, through an analysis of job task requirements for a series of jobs relating to several current occupational classifications. The translation of the new jobs into part of a career ladder to avoid dead-end occupations is more difficult since it involves the development and acceptance of educational equivalents of work-experience, assumes the availability of in-service or other training, and it implies some relaxing of strict educational requirements for promotion to "higher" rungs on the ladder. More new careers would be available if, for example, the steps between nurses' aides and professional nurses were made negotiable through in-service training and some acceptance of work experience in lieu of formal education. (15)

The possibilities for increasing employment for nonwhites in the health occupations, at different levels of skill and training, are illustrated by the projections in Table 5. (See page 24.) The projections refer to Census occupations listed in Table 1.

---

(15) Kilpatrick, E., Health Mobility Services Study, Research Foundation, City University of New York, is a study of the possibility of upward mobility in nursing occupations.

TABLE 5

Estimated Employment for Nonwhites in Selected Health Occupations in 1975

Occupation	Projections for 1975 (a) Total Employment (in 000)	Nonwhite Employment (in 000)	Nonwhite as % of Total
Dentists	149	8	5.3%
Pharmacists	163	5	3.1
Physicians	402	30	7.5
Professional Nurses	1,091	89	8.2
Medical, Social and Welfare Workers	37	6	15.4
Medical and Dental Technicians	352	43	11.9
Hospital Attendants (including nurses' aides)	1,229	344	28.0
Practical Nurses	575	97	16.9

(a) Projections refer to manpower requirements for achieving health goals by 1975.

The estimates are based on the representation of nonwhites in each of these occupations in the mid-1960's, and they also make some allowance for changes in this representation which can be expected because of economic growth, rising levels of educational attainment among nonwhites, and the nation's committment to eliminating discrimination in employment based on race. Reflecting the current representation of Negroes, Puerto Ricans and other nonwhites, the estimates indicate that the major opportunities will be in the non-professional service occupations associated with health care, in the technician occupations, and in medical social work. These are largely

occupations in which preparation is provided through vocational-technical education. The extent to which the projections will be realized in the coming decade will depend on the weight assigned to national priorities in health, and on the measures undertaken in the next few years to increase opportunities for vocational preparation for nonwhites.

Training Options in the 1970's

As a result of the expansion and increasing specialization in the health field, high school students in 1975 should have a number of training choices in the health service occupations. The health service field may be viewed as encompassing at least five distinct types of occupational areas which differ in the focus of their work. They are:

Community-Oriented Occupations
Patient-Oriented Occupations
Indirect Patient Service Occupations
Laboratory Occupations
General Support Occupations

While career ladders do not, as yet, exist in most of these groups, there is a sufficient similarity of basic skills required to contemplate the development of integrated instructional programs in each area. Figure 2 presents illustrative career ladders, placing these occupations in areas indicating possibilities for vertical mobility. (See page 26.) This suggestive model may be useful in the future development of integrated occupational training programs. So called "new career" positions should be considered as entry level occupations for each ladder or intermediate steps such as case aides or therapist aides.

FIGURE 2

Illustrative Job Ladders in Five Health Service Areas *

Education (approximate requirements)	Community Orientation	Direct Patient Service	Indirect Patient Service	Laboratory Work	General Support
College Degree or equivalent	Public Health Nurse Social Worker	Professional Nurse Occupational or Physical therapist	Nuclear or Bio-medical technician	Medical Technologist	Hospital Administrator Dietician
Two to three years post high school training	Social Work Aide	Technical Nurse Associate Degree Inhalation therapist Dental Hygienist	X-Ray Technician EEG, EKG technician	Cytotechnol-ogist Certified laboratory assistant	Ward Supervisor (Administration) Medical Records clerk
0 to two years post high school training	Casework Aide Recreation work aide	Practical Nurse Psychiatric aide Therapist's aide or assistant	Radiology assistant Sanitation assistant Dental assistant	Dental lab technician Histological technician Medical laboratory assistant	Dietary tech-nician aide Medical records aide
8th through 12th grade education or GED	Community mental health aide Family service aide	Nurses' aide Orderly Home attendant	Medical assistant Ambulance assistant	Medical laboratory aide	Ward clerk Food service aide

* It is assumed some mobility exists between these adjacent job ladders

An outline of training options which might be developed in several of these areas is as follows:

Patient and community service opportunities which can be made available include:

--- A 4-6 month training program to become a nurses' aide or medical orderly with some chance of later specializing in geriatrics, psychiatric or general nursing assistant. For some, the way will be open to receive educational credits while working toward a position as a licensed practical nurse or a registered nurse.

--- A 6 month to 1 year work-study program as a family or community health aide or physician's or dental assistant.

--- A 1 year program, after receiving a high school diploma, leading to a position as a licensed practical nurse or dental assistant.

--- A 2 year post-high school, junior college program leading either to a position as an RN, or as a technician in inhalation therapy, or as an aide in one of the new diagnostic or treatment fields.

--- A 2 year post-high school program as an X-ray technician or dental hygienist.

Opportunities for students who are less patient- or community-oriented which can be made available include:

--- A secondary level program leading to a position such as ward clerk, later, through in-service training, to a job as a records assistant or computer

attendant, and finally, a medical records librarian or computer programmer.

--- A 1 year post-high school vocational program for histological technician or medical laboratory assistant or dental technician.

--- A 2 or 3 year post-high school, junior college program for positions such as EEK or EKG technician or cytotechnologist.

Characteristics for successful employment in the direct patient service sector will include a desire and facility for working with people, knowledge of social and biological bases for illness, and a desire for service which is stronger than the desire for regular hours. The student exhibiting an interest in mechanical operations with an aptitude for mathematics and an interest in biological sciences would be a candidate for one of the many indirect patient service or laboratory-oriented occupations in the health industry.

In addition to these occupations, within the next ten years, it is anticipated that there will be new assistant positions available requiring 1-2 years of special post-high school training as occupational and physical therapy aides and in other specialties. One year of college level academic work or special high school courses in the biological and behavioral sciences will become necessary for mid-level positions in the health service fields.

Conclusion

An estimated 230,000 persons a year will be entering nursing and the non-professional health occupations in the coming decade. Some of these persons will be trained in special adult education courses, others -- primarily married women who have left the workforce -- will receive re-training and reenter employment. Some will train on-the-job after receiving a non-specialized education and still others, particularly in the newer medical technician and laboratory specialties, will receive training in one of the more than 7,000 proprietary technical and trade schools in the United States. However, the vocational education programs in high schools and junior colleges will constitute the largest single source of publicly-supported occupational preparation for young persons in most of the health-related non-professional fields. The rapid growth in career opoortunities in health service occupations should result in a much higher priority for these programs than present course completion or enrollment figures indicate. Planning for a coordinated growth of entry-level training, in-service training, and work-study programs will be essential to achieve goals in health.

IMPLICATIONS FOR PRIORITIES IN VOCATIONAL-TECHNICAL EDUCATION

The implications of the developments considered in occupational growth patterns and job training for vocational-technical education depend on several important assumptions which underlie the analysis. In order to promote stable growth in health occupations, a number of events must take place which are beyond the scope of vocational education to implement or to directly influence. Stable growth assumes that the following will happen by 1975:

(1) Most entry level personnel in hospitals and other medical institutions will be organized in unions or associations by the late 1970's.

(2) Minimum wage rates for entry level health service occupations will approach national minimum wages for other industries.

(3) Entrance requirements for all occupations above the aide level will include a high school education (or GED), and all nurses or laboratory or medical technicians will require some academic training beyond high school.

(4) Career ladders, and opportunities for advancement will appear in both nursing (patient-oriented) occupations in major urban areas, and, to a lesser extent, for medical laboratory workers and equipment attendants. There will be a growing requirement for family health workers in hospital outreach functions.

The priorities proposed for vocational-technical education are based on considerations of manpower demand and supply, in addition to the implications of the assumptions previously stated. Manpower supply in the health occupations in the next ten years will be least flexible for physicians, the occupation with the longest period of education and training. The greatest numerical shortages will probably develop for professional nurses, also an

occupation requiring extensive training. Avoiding bottlenecks in the health manpower fields means increasing the supply of persons in these two professions, and also developing health teams requiring lesser inputs of the services of physicians and nurses.

These considerations suggest an agenda of priorities for planning and research in vocational-technical education to take account of the implications of national goals in health for career opportunities in the coming decade. They are as follows:

(1) Meeting needs in the patient-oriented and the technician-oriented non-professional health occupations will provide a major challenge to develop new programs and enlarge many existing ones in vocational-technical education.

(2) Rapid growth in needs for nurses will make the expansion of programs for training Associate Degree and practical nurses an important responsibility for the vocational education system. Special consideration should be given to enlarging facilities for the Associate Degree programs for nurses in the junior colleges.

(3) Increasing the representation of young persons from the "left out" groups in American society in vocational education programs in the health fields will serve both to improve the economic status of people in these groups and to provide essential trained manpower to help implement goals in health.

(4) Closer coordination between local vocational education systems and community health centers will be needed to improve training for health occupations in the schools, and also to enlarge opportunities for entry training, retraining, and training for upgrading in the health fields for adults.

(5) An instructional program organized around a core curriculum in health should be introduced on the 11th and 12th grade levels to give students a background in biological sciences, behavioral science, and an overview of health practices, medical technology, and employment opportunities in the health field. This curriculum would increase the options available to students to assume an entry level job after high school graduation, to go on to further

technical training in industry, to enroll in patient-oriented and laboratory-oriented courses in junior colleges, or to prepare for the traditional health professions requiring four or more years of college.

(6) Manpower projections are generally available on a national basis while vocational education programs must be responsive to local needs. To better assess local developments, state and local vocational education systems should join forces with other institutions, public and private, to determine the probable future local and statewide needs in specialized health occupations. The institution of work-study programs and training for occupational upgrading are two potential program results from such cooperation.

APPENDICES

APPENDIX TABLE 1

Direct Employment by Detailed Occupation for the Health Goal
1962 and Projected 1975[a]
Number Employed (in 000)

Occupation	1962	Projections for 1975[b]	Percent Increase, 1962 to 1975
I. Professional, technical and kindred workers	1,357	2,564	89%
Accountants and auditors	4	6	50
Airplane pilots and navigators			
Architects			
College presidents, professors and instructors	10	18	80
Dentists	81	149	84
Designers and draftsmen			
Engineers	2	2	
Lawyers and judges	2	4	100
Librarians	8	11	38
Natural scientists	8	22	175
Nurses, professional	591	1,091	85
Personnel and labor relations workers	4	11	175
Pharmacists	125	163	30
Physicians and surgeons	238	402	69
Social, welfare and recreation workers	11	37	236
Teachers, elementary	1	2	100
Teachers, secondary	1	2	100
Technicians, electrical and electronic			

APPENDIX TABLE 1 (Continued)
Direct Employment by Detailed Occupation for the Health Goal
1962 and Projected 1975(a)
Number Employed (in 000)

Occupation	1962	Projections for 1975(b)	Percent Increase, 1962 to 1975
Technicians, medical and dental	171	352	106%
Technicians, other	2	4	100
Other professional and technical workers	98	288	194
II. Managers, officials and proprietors, except farm	51	108	112
Salaried managers	39	94	141
Self-employed	12	14	17
III. Clerical and kindred workers	409	870	113
Bookkeepers	23	37	61
Cashiers	5	11	120
Office machine operators	4	14	250
Secretaries, stenographers and typists	131	314	140
Shipping and receiving clerks	1	1	
Stock clerks and storekeepers	7	18	157
Telephone operators	13	15	15
Other clerical workers	225	460	104
IV. Sales workers	2	2	
Insurance and real estate agents and brokers			
Salesmen and sales clerks, retail trade			
Salesmen and sales clerks, other	2	2	

APPENDIX TABLE 1 (Continued)

Direct Employment by Detailed Occupation for the Health Goal
1962 and Projected 1975[a]
Number Employed (in 000)

Occupation	1962	Projections for 1975[b]	Percent Increase, 1962 to 1975
V. Craftsmen, foremen, and kindred workers	69	107	55%
Brickmasons, stonemasons and tilesetters			
Cabinetmakers and pattern makers			
Carpenters	5	7	40
Cranemen, derrickmen and hoistmen			
Electricians	4	6	50
Excavating, grading, and road machinery operators			
Foremen	4	5	25
Linemen and servicemen, telegraph, telephone and power			
Locomotive engineers			
Machinists and job setters			
Mechanics and repairmen, automobile	1	2	100
Mechanics and repairmen, other	25	42	68
Painters, construction and maintenance	6	9	50
Plumbers and pipefitters	3	5	66
Printing craftsmen			
Stationary engineers	10	14	40
Tinsmiths, coppersmiths, and sheet metal workers			

APPENDIX TABLE 1 (Continued)

Direct Employment by Detailed Occupation for the Health Goal
1962 and Projected 1975 (a)
Number Employed (in 000)

Occupation	1962	Projections for 1975 (b)	Percent Increase, 1962 to 1975
V. continued...			
Toolmakers, diemakers and setters			
Other	11	17	55%
VI. Operatives and kindred workers	63	79	25
Assemblers			
Attendants, auto service and parking			
Brakemen and switchmen, railroad			
Bus drivers	1	1	
Deliverymen and routemen	1	2	100
Checkers and inspectors, manufacturing			
Filers, grinders and polishers, metal			
Laundry and dry cleaning operatives	33	39	18
Mine operatives and laborers			
Painters, except construction and maintenance			
Sewers and stitchers, manufacturing			
Taxicab drivers and chauffeurs	2	1	-50
Truck and tractor drivers	3	4	33
Welders and flame cutters			
Other operatives and kindred workers	23	32	39

APPENDIX TABLE 1 (Continued)

Direct Employment by Detailed Occupation for the Health Goal
1962 and Projected 1975(a)
Number Employed (in 000)

Occupation	1962	Projections for 1975(b)	Percent Increase, 1962 to 1975
VII. Private household workers			
VIII. Service workers, except private household	1,021	2,374	133%
Attendants, hospital and other institutions	458	1,229	168
Barbers, hairdressers, and cosmetologists	2	4	100
Charwomen, janitors and porters	61	141	131
Cooks	48	89	85
Firemen, fire protection	1	1	
Guards, watchmen and doorkeepers	5	11	120
Policemen, sheriffs and marshalls			
Practical nurses	254	575	126
Waiters, bartenders, and counter workers	22	36	64
Other service workers, except private household	170	288	69
IX. Farm workers			
Farmers and farm managers			
Farm laborers and foremen			
X. Laborers, except farm and mine	12	16	33
XI. Total	2,984	6,120	105

(a) Source: Lecht, Leonard A., Manpower Requirements for National Objectives in the 1970's, op. cit., Appendix Table 25-3.

(b) Refers to manpower requirements for achievement of health goals in 1975.

Note: Detail may not add to totals due to rounding.

APPENDIX TABLE 2

Detailed Employment for Selected Health Occupations in 1962 and Projections for 1975[a] (in thousands)

Occupations	Employment		Percent Increase, 1962 - 1975
	Actual 1962	1975 Projections[b]	
	Number Employed	Number Employed	
Professional and Technical	1,333	2,511	89%
Dentists	81	149	84
Nurses, Professional	591	1,091	85
Physicians and Surgeons	238	402	69
College Teachers[c]	10	18	80
Social Welfare and Recreation Workers	11	37	236
Medical and Dental Technicians	171	352	106
Dental Hygienists	10	33	230
Medical Technologists	35	72	106
Medical X-ray Technicians	60	124	107
Others	66	123	86
Pharmacists	125	163	30
Medical Librarians[d]	8	11	38
Other Professional and Technical	98	288	194
Optometrists	17	50	194
Chiropractors	25	73	192
Physical Therapists	9	26	189
Occupational Therapists	7	21	200
Speech Pathologists and Audiologists[e]	11	34	209
Sanitarians[f]	11	31	182
Others	18	53	194
Salaried Managers (including Hospital Administrators)	39	94	141
Other	806	1,977	133
Hospital Attendants (including Nurses' Aides)	458	1,229	168
Practical Nurses	254	575	126
Dental Assistants[g]	69	127	84
Dental Lab Technicians	25	46	84

Footnotes are on following page.

APPENDIX TABLE 2 - FOOTNOTES

(a) Source: Manpower Requirements for National Objectives in the 1970's, op. cit., and Occupational Outlook Handbook, 1963 - 1964 edition, unless otherwise noted.

(b) Refers to manpower requirements for achievement of health goals in 1975.

(c) There were only about 3,000 actual medical sciences teaching faculty in universities and four-year colleges in Spring, 1963, according to HEW, OE Publication No. 53022-63, p. 17.

(d) There were about 3,000 registered medical records librarians in 1962.

(e) Per phone conversation, Health Resources Statistics Office, U.S. Public Health Service, August 6, 1968.

(f) Health Resources Statistics Office, 1965, Public Health Service Publication No. 1509.

(g) Per phone conversation, American Dental Association, July 31, 1968.

Note: Detail may not add to totals due to rounding.

APPENDIX TABLE 3

Estimated Graduates of Vocational-Technical Education
Health Occupation Programs for Fiscal Year 1967(a)

Occupational Title	DOT Code	Occupational Category in this report	Number Completing Education (in 000) Secondary Level	Post Secondary Level(b)	Total
Dental Assistant	078.378	Dental Assistant	1.1	1.2	2.3
Dental Hygienist	078.368	Dental Hygienist	---	.6	.6
Dental Lab Technician	712.381	Dental Lab Technician	.1	.3	.4
Medical Services	078.368	Medical Technician	.1	.2	.3
Cytology Technician	078.281	Medical Technician	---	---	---(c)
Histology Technician	078.381	Medical Technician	---	---	---(c)
Medical Lab Assistant	078.381	Medical Technician	.3	1.0	1.3
Nurse (Associate Degree)	075.378	Professional Nurse	---	2.9	2.9
Practical Nurse	079.378	Practical Nurse	2.3	23.0	25.3
Nurses' Aide	354.878	Hospital attendants, including nurses' aides	3.5	1.5	5.0
Inhalation Therapy Technician	079.368	Other Technicians	---	---	---(c)
X-Ray Technician	078.368	X-Ray Technician	.1	.5	.6
Optician	713.381	Other Technicians	.1	.1	.2
Surgical Technician	079.378	Other Technicians	---	.2	.2
Occupation Therapy Assistant	079.368	Other Technicians	---	---	---(c)
Physical Therapy Assistant	079.368	Other Technicians	---	---	---(c)
Other	-------	Other Technicians	.7	.8	1.5

(a) Source: Based on reports of state boards of vocational education, does not include other public job training programs such as MDTA projects.

(b) 40 percent has been added to the reported figure from OE, since only about 400 of 800 junior and community colleges are represented by their estimated completion figures.

(c) These are new programs with students enrolled in training courses but few graduates.

APPENDIX TABLE 4

D.O.T. Occupations and Related Instructional Programs
for Selected Health Occupations*

Dictionary of Occupational Titles		U.S. Office of Education Classification	
Code	Occupational Title (Vol. 1)	Code	Instructional program
	Dental Occupations	07.01	Dental Included in this category are occupations concerned with supportive services to the dental profession.
078.378	Dental Assistant	07.0101	Dental Assisting A combination of subject matter and experiences designed to prepare a person to assist the dentist at the chairside in the dental operatory, to perform reception and clerical functions, and to carry out selected dental laboratory work.
078.368	Dental Hygienist	07.0102	Dental Hygiene (Associate Degree) A combination of subject matter and experiences designed to prepare a person to provide services to to patients, such as performing complete oral prophylaxis, applying medication, and providing dental health education services, both for chairside patients and in community health programs, under the supervision of the dentist. (Included as 16.0301 Dental Hygiene, Associate Degree, under Technical Education.)
712.281	Dental Ceramist	07.0103	Dental Laboratory Technology A combination of subject matter and experiences designed to prepare a person to execute the work in producing restorative appliances required for the oral health of the patient as authorized by the dentist.
712.381	Contour-Wire Specialist, Denture		
712.381	Dental-Laboratory Technician		
712.381	Molder, Bench		
712.381	Set-up Man, Denture		
712.781	Orthodontic Gold-Band Maker		
		07.0199	Dental, Other Include here other organized subject matter and experiences emphasized in occupations, not listed above, which are concerned with supportive services to the dental profession (Specify.)

* Draft of Taxonomy being prepared by Division of Vocational Technical Education, Program Planning and Evaluation Branch, U.S. Office of Education, 1968.

APPENDIX TABLE 4 (Continued)

D.O.T. Occupations and Related Instructional Programs
for Selected Health Occupations

Dictionary of Occupational Titles		U.S. Office of Education Classification	
Code	Occupational Title (Vol. 1)	Code	Instructional Program
	Medical Laboratory Occupations	07.02	Medical Laboratory Technology Planned subject matter and laboratory experiences concerned with bacteriological, biological, and chemical tests to provide data for use in diagnosis and treatment of diseases -- using microscopes, micrometers, and other instruments. Persons prepared in this area usually work under the supervision of medical technologists, clinical pathologists, or physicians.
078.281	Cytotechnologist	07.0201	Cytology (Cytotechnology) A combination of subject matter and experiences designed to prepare a person to strain and screen smeared slides for determination of abnormalities of exfoliated cells that may assist in the diagnosis of cancer. This work is performed under the supervision of a physician.
078.381	Tissue Technologist	07.0202	Histology A combination of subject matter and experiences designed to enable a person to prepare, section, and stain tissues for microscopic study, usually by a pathologist or other clinical scientist.
078.281	Biochemistry Technologist	07.0203	Medical Laboratory Assisting A combination of subject matter and experience designed to prepare a person to work under the supervision of medical technologists, clinical pathologists, or physicians to perform routine clinical laboratory procedures. Advanced courses in biomedicine and microbiooogy needed for some jobs.
078.281	Microbiology Technologist		
078.381	Medical-Laboratory Assistant		
078.381	Medical Technologist	07.0203	Medical Laboratory Assisting
078.678	Laboratory Assistant, Plasma Drawing-Off		

APPENDIX TABLE 4 (Continued)

D.O.T. Occupations and Related Instructional Programs
for Selected Health Occupations

Dictionary of Occupational Titles		U.S. Office of Education Classification	
Code	Occupational Title (Vol. 1)	Code	Instructional Program
078.281	Hematology Technologist	07.0204	Hematology A combination of subject matter and experiences organized to prepare a person to collect blood and perform complete blood counts; prepare and stain blood smears; perform hemoglobin determinations; carry out tests to determine bleeding time, coagulation time, sedimentation rate, and prothrombin time; and to determine relative amounts of plasma and corpuscles.
		07.0299	Medical Laboratory Technology, Other Include h other organized subject matter and experiences emphasized in occupations, not listed or classifiable above, which are concerned with medical laboratory technology. (Specify.)
	Nursing Occupations	07.03	Nursing A combination of subject matter and clinical experiences designed to prepare a person to provide nursing care to patients in hospitals, sanitariums, clinics, or other institutions by administering medications and treatments, assisting the physician during treatment and examination of patients, or performing related auxiliary services.
075.378	Nurse, Anesthetist		
075.378	Nurse, General Duty		
075.378	Nurse-Midwife		
075.378	Nurse, Private Duty		
075.378	Nurse, Staff, Occupational Health Nursing		
079.378	Nurse, Licensed Practical	07.0302	Practical (Vocational) Nursing A combination of subject matter and supervised clinical experiences designed to prepare a person to give direct nursing care under the supervision of a nurse or physician.
354.878	Midwife		
354.878	Nurse, Practical		
355.878	Cottage Parent	07.0303	Nursing Assistance (Aide) A combination of subject matter and experiences designed to prepare a person to perform simple tasks involved in the personal care of individuals receiving nursing services. These tasks are performed under the supervision of a nurse.
355.878	Nurse Aide		
355.878	Orderly		

APPENDIX TABLE 4 (Continued)

D.O.T. Occupations and Related Instructional Programs
for Selected Health Occupations

Dictionary of Occupational Titles		U.S. Office of Education Classification	
Code	Occupational Title (Vol. 1)	Code	Instructional Program
355.878	Psychiatric Aide	07.0304	Psychiatric Aide A combination of subject matter and experiences designed to prepare a person to assist a psychologist in rehabilitating mentally ill patients through recreational and occupational activities, training in new patterns of living, physical care of patients, and giving prescribed medication.
079.378	Surgical Technician	07.0305	Surgical Technician (Operating Room Technician) A combination of subject matter and experiences designed to prepare a person to serve as a general technical assistant on the surgical team in the operating suite.
078.378	Obstetrical Technician	07.0306	Obstetrical Technician A combination of subject matter and experiences designed to prepare a person to assist in the delivery, care, and feeding of infants. Instruction includes administration of medication, hygienic procedures, routine laboratory work, and sterilization of equipment and supplies.
354.878	Home Attendant	07.0307	Home Health Aide A combination of subject matter and experiences designed to prepare a person to care for the nutritional, hygienic, and recreational needs of elderly, convalescent, or handicapped persons in the patient's home.
		07.0308	School Health Aide A combination of subject matter and experiences designed to prepare a person, working under the supervision of a physician or nurse, to administer tests, basic first aid and medication, and to cooperate with school administrators in serving the hygienic, nutritional, and recreational needs of students.

APPENDIX TABLE 4 (Continued)

D.O.T. Occupations and Related Instructional Programs
for Selected Health Occupations

Dictionary of Occupational Titles		U.S. Office of Education Classification	
Code	Occupational Title (Vol. 1)	Code	Instructional Program
078.368	Radiologic Technologist	07.0501	Radiologic Technology (X-Ray) A combination of subject matter and experiences designed to prepare a person for the safe use of X-ray equipment in both laboratory and clinical settings under the supervision of a radiologist or other physician. (Included as 16.0304 Radiologic Technology, X-Ray, under Technical Education.)
07.368	Inhalation Therapist	07.0903	Inhalation Therapy Preparation includes a combination of subject matter and experiences designed to prepare a person to perform procedures and operate and maintain equipment used in supporting respiratory functions, including the administration of oxygen and other sustaining gases, as directed by a physician
079.368	Occupational Therapy Aide	07.0401	Occupational Therapy A combination of subject matter and experiences designed to prepare a person to assist the physical therapist in implementing the plan of therapy for a patient as prescribed by a physician.
079.128	Manual-Arts Therapist	07.0402	Physical Therapy A combination of subject matter and experiences designed to prepare a person to assist the physical therapist in implementing the plan of therapy for a patient as prescribed by a physician.
079.368	Corrective Therapist		
079.368	Physical Therapist		
355.878	Attendant, Physical Therapy		
078.368	Prosthetist	07.0403	Prosthetics A combination of subject matter and experiences designed to prepare a person to write specifications for and to make and fit artificial limbs, following the prescription of a qualified medical practioner. Instruction includes the study of anatomy, biomechanics, engineering as related to prosthetic appliances, and shop experience in prosthetic construction.

APPENDIX TABLE 4 (Continued)

D.O.T. Occupations and Related Instructional Programs
for Selected Health Occupations

Dictionary of Occupational Titles		U.S. Office of Education Classification	
Code	Occupational Title (Vol. 1)	Code	Instructional Program
		07.0399	Nursing, Other Include here other organized subject matter and experiences emphasized in occupations not listed or classifiable above, which are concerned with nursing. (Specify.)
	Medical Technicians		
199.187	Radiation Monitor	07.0702	Radiological Health Technician A combination of subject matter and experiences designed to prepare a person to conduct radiological evaluations of exposure to X-ray, gamma, and alpha emitters and to recommend measures to insure maximum protection.
078.381	Nuclear Medical Technologist	07.0503	Nuclear Medical Technology A combination of subject matter and experiences designed to enable a person to prepare, administer, and measure radioactive isotopes in therapeutic, diagnostic, and tracer studies, utilizing a variety of radioisotope equipment.
078.368	Electroencephalograph Technician	07.0901	Electroencephalograph Technician A combination of subject matter and experiences designed to prepare a person to operate electrical equipment which records brain waves on a graph to be used by a medical practioner in diagnosing brain disorders. Instruction in minor repairs and maintenance of equipment may be included. (Included as 16.0302 Electroencephalograph Technician under Technical Education.)
078.368	Electrocardiograph Technician	07.0902	Electrocardiograph Technician A combination of subject matter and experiences designed to prepare a person to operate an electrocardiograph machine, recording electromotive variations in the action of heart muscle, to provide data for diagnosis and treatment of heart ailments by a physician. Instruction in minor repairs and maintenance of equipment may be included.

APPENDIX TABLE 4 (Continued)

D.O.T. Occupations and Related Instructional Programs
for Selected Health Occupations

Dictionary of Occupational Titles		U.S. Office of Education Classification	
Code	Occupational Title (Vol. 1)	Code	Instructional Program
078.368	Orthotist	07.0404	Orthotics A combination of subject matter and experiences designed to prepare a person to write specifications for and to make and fit braces and appliances for body deformities and disorders, following the prescription of a qualified medical practioner. Instruction includes the study of anatomy, biomechanics, engineering as related to orthotic appliances, and shop experience in orthotic construction.
712.281	Orthopedic-Appliance-And-Limb Technician		
712.884	Orthopedic-Cast Specialist		
	Miscellaneous Occupations		
223.887	Central-Supply Worker	07.0905	Central Supply Technician A combination of subject matter and experiences designed to prepare a person to adjust, clean, sterilize and assemble hospital equipment, supplies and instruments according to prescribed procedures and techniques.
168.287	Sanitary Inspector	07.0703	Sanitarian Assistant A combination of subject matter and experiences designed to prepare a person, under supervision of a professional sanitarian, to investigate public and private establishments to determine compliance with or violation of public sanitation laws and regulations. These individuals take samples of such materials as water, food, and air, and perform contamination tests.
079.368	Medical Assistant	07.0904	Medical Assistant (Assistant in Physician's Office) A combination of subject matter and experiences designed to prepare a person to perform many and varied duties such as scheduling appointments, receiving patients, recording case histories, ushering the patient into the consultation or examination room, performing other functions to assist physicians in professional offices and admitting offices of hospitals and related institutions.

APPENDIX TABLE 4 (Continued)

D.O.T. Occupations and Related Instructional Programs
for Selected Health Occupations

Dictionary of Occupational Titles		U.S. Office of Education Classification	
Code	Occupational Title (Vol. 1)	Code	Instructional Program
		07.0906	Community Health Aide A combination of subject matter and experiences designed to prepare a person to serve as liaison between professional health workers and the recipients of health services. Instruction emphasizes basic understanding of biology, communicable diseases, environmental health, personal hygiene, infant and medicines, and family and community organization.
354.878	First-Aid Attendant	07.0907	Medical Emergency Technician A combination of subject matter and experiences designed to prepare technicians to become members of the health team, qualified to: a) respond to medical emergency calls; b) evaluate the nature of the emergencies; c) take appropriate prompt action to reduce the medical hazards to the receiving station; d) serve as technical assistant to the emergency room staff of general hospitals.
355.878	Ambulance Attendant		
355.878	Emergency Entrance Attendant		