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ABSTRACT

The present study was conducted and designed to: (1) evaluate the adequacy of existing dental manpower supplies in New York State; (2) analyze and make projections of trends in New York's supply of dentists and in the demand for dental services; (3) determine whether or not a shortage of dentists is to be expected in New York; and (4) make recommendations for meeting any predictable shortage in New York's supply of dental services. It was found that the State is confronted with 2 major problems in planning for the dental manpower supplies that will be required to meet the future care demands of its residents: (1) the geographic maldistribution of private practitioners in the State; and (2) an increasingly greater reliance on out-of-state schools to provide dental training for future New York practitioners. The first problem, that the majority of dentists living and practicing in the urban communities, could be solved by active recruitment efforts of dental school graduates to outlying areas to attract them to those areas in need of dentists. With regard to the second problem, if out-of-state schools were to adopt admissions policies that would effectively be seriously jeopardized. It is suggested that dental training facilities in the State be expanded to meet the demand for more dentists. (HS)

NEW YORK STATE DENTAL MANPOWER STUDY

THE UNIVERSITY OF THE STATE OF NEW YORK THE STATE EDUCATION DEPARTMENT
BUREAU OF RESEARCH IN HIGHER AND PROFESSIONAL EDUCATION
ALBANY, NEW YORK 12210

AUTUMN 1971

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DENTAL MANPOWER STUDY

Henry Wechsler

The University of the State of New York
THE STATE EDUCATION DEPARTMENT
Bureau of Research in Higher and Professional Education
Albany, New York 12210
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FOREWORD

The present study was conducted under contract with the New York State Education Department.

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The New York State Dental Society made an important contribution to the study by endorsing the survey of New York dentists. Their support helped to make possible the very high rate of responses in this survey.

The study was conducted with the invaluable assistance of Allan F. Williams and Denise Thum, who contributed much to the final product.

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ABSTRACT

The aims of this study were to: (1) evaluate the adequacy of existing dental manpower supplies in New York State; (2) analyze and make projections of trends in New York's supply of dentists and in the demand for dental services; (3) determine whether or not a shortage of dentists is to be expected in New York; and (4) make recommendations for meeting any predictable shortage in New York's supply of dental services.

Major sources of data included a mailed questionnaire survey of approximately 900 dentists in private practice in New York, and a special study investigating the extent to which dentists' choice of practice location is related to place of residence at the time of enrollment in dental school or to the location of the dental school attended (New York State or out-of-state). Other major sources of data included information provided by the New York State dental schools on numbers of applicants, freshmen, and graduates, and statistical reports prepared by the American Dental Association, the Division of Dental Health of the U.S. Public Health Service, and the New York Board of Dental Examiners. The 12 New York Office of Planning Coordination (OPC) regions were selected as appropriate geographical subunits for detailed analyses of conditions within New York State.

At present, New York State has the most favorable dentist-to-population ratio in the country. However, as is discussed in chapter 3, there are wide regional differences in the supply of dentists, suggesting that existing inadequacies in the availability of dental services are attributable primarily to maldistribution rather than to

a statewide shortage of dentists. There are indications that New York City and the Nassau-Suffolk and Mid-Hudson OPC regions may be over-supplied with dentists. The Central region appears to have an adequate supply of dentists. In contrast, the St. Lawrence OPC region is seriously undersupplied with dentists. Conditions are also relatively unfavorable in several other areas, including the Lake Champlain-Lake George and Southern Tier-West OPC regions.

Given the present distribution of dentists, however, New York's dental care system appears to have some reserve capacity to accommodate moderate near-term increases in demand. The mail survey of New York dentists indicated that in all OPC regions except St. Lawrence, the proportion of dentists who want more patients is greater than the proportion wanting fewer. In addition, as dental demand increases in the future, it may be possible to increase productive capacity through more widespread auxiliary utilization.

The Nation's demand for dental care is expected to increase more rapidly than the supply of dental services, due to population growth and growth in per capita demand. Thus, growth in demand may produce an increasing stress on New York's dental care system, unless the State's supply of dental services increases at a commensurate rate (see chapter 4).

The population of New York State is expected to increase by 11 percent during the 1970's, and by 26 percent between 1980 and 2000. The largest population increases are predicted for the following OPC regions: Nassau-Suffolk, Mid-Hudson, Upper Hudson, Central, Southern Tier-East, and Lake Ontario. In addition to the fact that population growth will contribute to total demand, it may be anticipated that the

per capita demand for dental care will increase as public and private insurance coverage is extended to a larger segment of the population. Furthermore, since persons who have not received adequate dental care often have a large backlog of unmet needs, future increases in per capita demand may be greatest in those regions with relatively few dental visits per capita in the past. As indexed by visits per capita in 1970, it would appear that existing unexpressed needs may be greatest in the following regions: Lake Champlain-Lake George, St. Lawrence, Central, Southern Tier-East, and Southern Tier-West. Unless the supply of dental services increases to compensate for rising demand, critical situations could develop during the 1970's in areas with significant backlogs of unmet needs or in those which undergo rapid population expansion.

The present relationship between dental supply and demand in New York State would be maintained only if the supply of dental services were to increase at approximately the same rate as the demand for dental care. Trends in dental supply are discussed in chapter 5. From 1960 to 1968, New York's dentist-to-population ratio decreased in favorability by 4 percent. Similar decreases occurred in other large urban states with relatively favorable dentist-to-population ratios. Although increase in dental supply compensated for population growth in the Nassau-Suffolk and Mid-Hudson OPC regions, supply failed to keep pace with population increases in some of the smaller OPC regions: the Mohawk Valley, Lake Champlain-Lake George, Central, Southern Tier-East, and Southern Tier-West regions. Since dentists are already in short supply in several of these regions, it may be anticipated that the imbalance between supply and demand will increase if present trends

continue.

Chapter 6 presents information on sources of New York's supply of dentists. In the past, the majority of New York dentists have received their training at dental schools in New York State. However, New York has not kept pace with other states in the rate of expansion of its training facilities. Therefore, as the number of New Yorkers who wish to attend dental school has increased, there has been an increasing reliance on nearby states to provide dental training for New York residents. Over half of all New York dental school freshmen now attend out-of-state schools.

In a special study of factors related to choice of practice location, it was found that New York residents who had graduated from selected out-of-state schools were somewhat less likely to practice in New York than those trained at New York schools. Thus, the present reliance on out-of-state training may cost New York the loss of some dentists who would remain in the State to practice if they were able to attend New York schools. A major finding of this study, however, relates to choice of practice location among New York residents trained within the State. It was found that nearly all of the 1950, 1955, and 1960-65 graduates of New York dental schools who resided in the Metropolitan New York area at the time of enrollment currently practice in that area. Similarly, those who were originally from less highly urbanized areas with relatively unfavorable dental supply conditions either established practices in the same OPC region as their original residence or in a similar region. This finding has significant implications for dealing with the problem of New York's maldistribution of dentists. Thus, an appropriate approach to New

York's distribution problem may be to actively recruit students and otherwise encourage careers in dentistry among young people from areas outside of Metropolitan New York with shortages of dentists.

Several approaches to meeting the demand for dental services are discussed in chapter 7. These recommendations were developed in consultation with the project's Advisory Committee.

New York State is confronted with two major problems in planning for the dental manpower supplies that will be required to meet the future care demands of its residents: (1) the geographic maldistribution of private practitioners in the State, and (2) an increasingly greater reliance on out-of-state schools to provide dental training for future New York practitioners.

The evidence suggests that New York's primary dental manpower problem is likely to continue to be one of maldistribution. Unless active measures are taken to reverse trends in the relationship between dental supply and demand, it can be anticipated that New York's distribution problem will increase in the future. Several OPC regions with unfavorable current supply conditions have high proportions of older dentists, and may suffer from replacement problems as these dentists retire. In addition, supply shortages in these areas may be compounded by the fact that older dentists tend to work fewer hours than younger men and are less likely to employ auxiliaries or to expand their practices to meet increasing care demands.

One possible approach to the maldistribution problem would involve offering some form of inducement to graduating dental students or to practitioners in order to encourage them to practice in areas that are undersupplied with dentists. Another approach would be to

actively recruit dental students from areas with shortages of dentists. As mentioned above, this may be the most appropriate approach to the maldistribution problem in New York State, since the study of factors related to practice location found that approximately 80 percent of New York dental school graduates who were originally from one of the less highly urbanized regions of the State either returned to their home area to practice or established practice in some other area outside of Metropolitan New York.

Another problem facing New York State is its increasing reliance on out-of-state schools to provide dental training for prospective New York practitioners. If out-of-state schools were to adopt admissions policies which would effectively exclude large numbers of New Yorkers, the State's dental manpower situation could be seriously jeopardized.

New York's overdependence on out-of-state schools appears to have resulted largely from the slow expansion of dental training facilities within the State. The shortage of freshman positions at New York dental schools will be remedied in part by the addition of Stony Brook and by planned increases in the number of freshman openings at the other New York schools. Serious consideration should be given to ways of stimulating enrollment at and productivity of the existing dental schools in the State. This could be done by providing funds for more rapid expansion of existing training facilities and by implementing a program of financial assistance to the nonpublic dental schools of the type granted to nonpublic medical schools in New York State. Before establishing a new dental school in the State, it would seem advisable to make the best possible use of the existing facilities. Finally, financial assistance or other incentives might be offered to qualified

resident applicants to enable or encourage them to attend dental school in New York State.

It is strongly recommended that a systematic study be conducted of patterns of dental school applicancy and admissions among New York residents in order to (1) evaluate the effects of opening Stony Brook and expanding other training facilities, and (2) determine what happens to unsuccessful applicants who do not enroll at New York schools. This information could be of considerable value in planning appropriate programs and approaches to meet New York's demand for dental manpower.

It must be recognized that any programs designed to alleviate the maldistribution of dentists or to increase the capacity of dental training facilities in New York State will require several years to be implemented and to become effective. Some of the evidence discussed in the present report suggests that the efficiency and productive capacity of New York's dental care system could be considerably increased through more widespread and effective auxiliary utilization. Consideration should be given to the possibility of training and actively promoting the employment of more paraprofessionals, as one approach to meeting New York's future dental manpower needs.

CHAPTER 1: INTRODUCTION

Health care demands in the United States are rising sharply due to population growth, rising levels of income and education, and the advent of government-sponsored programs to provide health care to the poor and aged. However, the supply of health manpower has not increased to match the increase in demand. Given these trends, an acute shortage of health manpower is inevitable in the future.

The field of dental health offers an illustration of this manpower problem. The United States has one of the most favorable dentist-to-population ratios in the world, and the absolute number of dentists in the country is constantly increasing. However, while the number of dentists is increasing, the number of dentists relative to the population has decreased since 1950 and is expected to continue to decrease. This trend, combined with the fact that an ever-increasing proportion of the population is seeking dental care, has led experts in the field to predict that by 1975 there will be fewer dentists in the United States than needed to cope adequately with dental care demands. Thus, the Bureau of Health Manpower (1) has predicted that there will be 120,000 dentists in 1975, but that 135,000 will be required. Johnson (2) estimated that there will be 28,000 fewer dentists than needed in 1975, and Cole and Cohen (3) have estimated that, by 1980, there will be between 9,000 and 38,500 fewer dentists than needed.

Action must be taken well in advance in order to deal with this anticipated shortage of dentists. For example, it could take 10 years or more to plan and construct a new dental school and for the school to produce its first graduates. Given the shortage of dentists pre-

dicted on a national level, it was decided to conduct an analysis of dental manpower in New York State. The aims of this study were as follows: (1) to evaluate the adequacy of current dental manpower supplies in New York State; (2) to analyze and make projections of trends in the supply of dentists and in dental demand for New York up to 1980; (3) to determine whether or not a shortage of dentists is to be expected in New York; and, if a shortage can be expected, (4) to discuss possible courses of action to anticipate and alleviate the predicted shortage.

CHAPTER 2: METHODS AND DATA SOURCES

A major purpose of the project was to evaluate local dental supply and demand conditions within geographical subunits of New York State, as well as to examine conditions for the State as a whole. The 12 New York Office of Planning Coordination (OPC) regions were selected as appropriate areas for detailed analyses of conditions within the State; a map of New York by OPC region is presented in appendix B with a list of the counties comprising each of the 12 regions. The present report also includes information from 11 other large urban states: California, Connecticut, Illinois, Indiana, Massachusetts, Michigan, New Jersey, Ohio, Pennsylvania, Texas, and Wisconsin. The principal sources of data are described below.

Mail survey of New York dentists. In order to obtain information on dental supply and demand within each of the 12 OPC regions, a mailed questionnaire survey was conducted during late 1970 among a sample of dentists then in private practice in New York. Separate samples were drawn for each region, and questionnaires were mailed to a total of 1,040 dentists. Among these, 924 were eligible for inclusion in the sample; 116 were found not eligible because they had retired or were deceased, or because they had moved out of the State or were not in private practice. Completed questionnaires were received from 878, representing 95 percent of those eligible. This unusually high response rate permits considerable confidence in the survey findings, since the possibility of sampling bias can be discounted. Appendix C includes a copy of the questionnaire and a more detailed description of the sample and the study methods.

Mail survey of New York dental society officers. Information on the local supply of dentists and on factors affecting demand also was obtained through a questionnaire mailed to 53 officers of the 11 district dental societies in New York State; 52 of these dental leaders returned completed questionnaires. A copy of the questionnaire is shown in appendix C.

Study of cohorts: original residence, dental school location, and location of practice. A special study was conducted to determine the extent to which dentists' choice of practice location is related to place of residence at the time of enrollment in dental school or to the location of the dental school attended. Current practice location was determined for three groups of dentists: (1) all who were New York residents at enrollment and who graduated from New York dental schools in 1950, 1955, and 1960-65; (2) all who were out-of-state residents at enrollment and who graduated from New York dental schools during these years; and (3) all who were New York residents at enrollment and who graduated during these years from the five out-of-state schools most frequently attended by New Yorkers -- Georgetown, Howard, Pennsylvania, Temple, and Tufts. Names of graduates were furnished by the schools, together with place of residence at the time of enrollment for graduates of the three New York schools in the study (Buffalo, Columbia, and New York University). The 1970 American Dental Directory (4) was then consulted to determine where these dentists are practicing.

Mail survey of U.S. dental school deans. A mailed questionnaire survey was done among the deans of all dental schools in the United States in order to obtain their views on changes in dental supply and

demand during the 1970's. Completed questionnaires were returned by 54 of the 59 deans. Appendix C includes a copy of the questionnaire.

Brief telephone interviews with New York dental school deans. Deans of the four New York dental schools were interviewed by telephone concerning admissions practices at their schools and any trends foreseen in the admissions practices of out-of-state dental schools. A copy of the interview schedule is shown in appendix C.

Other information from dental schools. The New York dental schools were most helpful in providing information on numbers of applicants, freshmen, and graduates from 1960-70, numbers of New York residents enrolled as freshmen, and projected numbers of freshmen and graduates for 1970-80. The dental schools also provided lists of graduates for the cohort study described above.

Other sources. Other major sources of information for the present report included statistical reports prepared by the American Dental Association, the Division of Dental Health of the U.S. Public Health Service, and the New York Board of Dental Examiners in cooperation with the American Association of Dental Examiners.[1] Additional information was obtained from a number of key individuals in dentistry, public health, and graduate education. Appendix D presents a complete list of references.

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[1] The 1968 Survey of Dentists Licensed in New York was not yet available when the present report was prepared. Therefore, information was obtained from the 1966 Survey of Dentists Licensed in New York by the New York Board of Dental Examiners and the American Association of Dental Examiners.

CHAPTER 3: THE CURRENT STATUS OF NEW YORK'S DENTAL CARE SYSTEM

At present, New York is in a relatively favorable position with the highest overall dentist-to-population ratio in the country. Table 1 presents the most recent information available on dentist-to-population ratios for New York and 11 other large urban states.

A count by the American Dental Association based on the American Dental Directory (5) found that New York had a total of 14,817 non-Federal dentists in 1968, with a dentist-to-population ratio of one dentist for every 1,230 persons (see table 1).[2] The entire Nation had a ratio of 1:1,824, and ratios in the 11 comparison states ranged from 1:1,386 in Massachusetts to 1:2,515 in Texas. Similarly, New York ranked first in the Nation in its 1968 practitioner-to-population ratio (1:1,454), according to information collected by the Division of Dental Health of the U.S. Public Health Service (6). As table 1 shows, New York had a specialist-to-population ratio of 1:16,745 in 1968, ranking fourth after California, Massachusetts, and Connecticut among large urban states (7). The American Dental Association count indicated that 7 percent of New York's 14,817 non-Federal dentists were specialists, compared with 8 percent for the Nation as a whole.[3]

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[2] These counts by the American Dental Association include retired dentists and 1968 dental school graduates, and exclude dentists in the Federal services.

[3] Appendix E presents numbers of dentists by state.

TABLE 1: 1968 Dentist-to-Population Ratios by State for Total Dentists, Dental Practitioners, and Specialists

	Total Dentists D:P	Practitioners D:P	Specialists D:P
New York	1:1,230	1:1,454	1:16,745
California	1,544	1,801	12,884
Connecticut	1,490	1,716	14,937
Illinois	1,704	2,046	24,270
Indiana	2,182	2,543	24,363
Massachusetts	1,386	1,633	14,672
Michigan	1,851	2,127	18,422
New Jersey	1,573	1,806	17,782
Ohio	2,056	2,407	27,337
Pennsylvania	1,728	2,048	27,701
Texas	2,515	2,766	29,850
Wisconsin	1,656	1,990	36,203
TOTAL U.S.	1,824	2,121	21,962

Sources:

1 Distribution of Dentists in the United States by State, Region, District, and County, Bureau of Economic Research and Statistics, American Dental Association, 1969.

2 Division of Dental Health, U.S. Public Health Service (unpublished tables).

3 Facts About States, Bureau of Economic Research and Statistics, American Dental Association, 1969.

Despite New York's national preeminence in its supply of dental manpower, wide variations exist within the State. According to the most recent figures on dentists licensed in New York (8), 13,690 dentists were registered as of August 1970, and 77 percent of these were located in New York City, Nassau and Suffolk counties, and the Mid-Hudson region. Table 2 presents the distribution of dentists and dentist-to-population ratios for each of the 12 Office of Planning Coordination (OPC) regions. New York City has the most favorable ratio (1:1,125), followed by Nassau-Suffolk and Mid-Hudson. The St. Lawrence region has by far the least favorable ratio, with only one dentist for every 2,882 persons. In addition, five other regions have ratios below the 1968 national average of one dentist per 1,824 persons; Central, Lake Champlain-Lake George, the Mohawk Valley, Southern Tier-East, and Southern Tier-West.[4]

Undoubtedly, there are regional differences in the demand for dental services, since dental demand is related to such factors as the socioeconomic level of the population, the proportion with dental insurance, and fluoridation of the water supply. The following sections deal with the question of whether or not the current supply of dental services in New York is adequate to meet existing and near-term demands.

Are more dentists needed at the present time? In the mail survey of practicing New York dentists, dentists were asked to estimate the adequacy of the supply of dentists in their area. As may be seen in

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[4] Appendix E presents numbers of dentists by OPC region.

TABLE 2: 1970 Distribution of Dentists and Dentist-to-Population Ratios by OPC Region for Dentists Licensed and Residing in New York

	Number[1]	%	D:P[2]
Nassau-Suffolk	2,070	15.2%	1:1,277
New York City	6,993	51.1	1,125
Mid-Hudson	1,420	10.4	1,278
Upper Hudson	455	3.3	1,825
Mohawk Valley	234	1.7	1,919
Lake Champlain-Lake George	99	0.7	2,166
St. Lawrence	93	0.7	2,882
Central	373	2.7	2,036
Southern Tier-East	236	1.7	2,087
Southern Tier-West	223	1.6	2,212
Lake Ontario	642	4.7	1,675
Western	852	6.2	1,628
TOTAL N.Y.	13,690	100.0	1,321

Sources:

1 Compiled from material provided by Dr. Donald F. Wallace, New York Board of Dental Examiners.

2 Based on information from the 1970 U.S. Census.

table 3, the survey findings indicate that 61 percent of all New York general practitioners believe that their area has enough dentists, and 32 percent feel that there are more than enough to handle the current demand. It must be recognized, however, that percentages for the State as a whole are strongly influenced by findings for New York City, Nassau-Suffolk, and Mid-Hudson, since these regions include approximately three-quarters of all dentists in the State.

The highest proportion reporting a need for more dentists (35 percent) was found among general practitioners in the St. Lawrence area, the region with the least favorable dentist-to-population ratio; this was the only region in which no dentists reported that there are more than enough dentists now. A need for more dentists was also reported by approximately one out of four dentists in the Southern Tier-East and Southern Tier-West regions, both of which have unfavorable dentist-to-population ratios.

Conversely, many dentists in areas with high dentist-to-population ratios indicated that their area has more than enough dentists to handle the current demand. An excess of dentists was reported by more than one-third of the dentists in the New York City, Nassau-Suffolk, and Mid-Hudson regions and by 30 percent of the Western region dentists. Finally, despite the relatively unfavorable dentist-to-population ratio in the Central region, 25 percent of the dentists there reported that the area has more than enough to handle the demand.

Information on the local supply of dentists was also obtained through the mail survey of dental society officers. Among the 52 dental leaders who returned the questionnaire, 69 percent indicated that there

TABLE 3: Estimates by New York General Practitioners of the Supply of Dentists in OPC Regions

	Need More	Have Enough	Have Too Many
Nassau-Suffolk	8.5%	50.7%	40.8%
New York City	3.0	62.2	34.8
Mid-Hudson	4.1	60.8	35.1
Upper Hudson	15.6	74.0	10.4
Mohawk Valley	12.3	74.0	13.7
Lake Champlain-Lake George	19.4	66.7	13.9
St. Lawrence	35.0	65.0	0.0
Central	8.4	66.2	25.4
Southern Tier-East	23.4	59.4	17.2
Southern Tier-West	28.3	60.0	11.7
Lake Ontario	18.4	67.1	14.5
Western	16.4	54.1	29.5
TOTAL N.Y.	7.3	60.7	32.0

Source: Mail survey of New York dentists, 1970.

are enough general practitioners to handle the current demand in the area covered by their dental society, 21 percent felt that there are too many, and 10 percent said that more are needed. Dental society officers were also asked about the supply of specialists in their area. According to their estimates, New York is undersupplied with pedodontists and oral pathologists, and may be oversupplied with oral surgeons and prosthodontists. Dental society officers' estimates of the supply of specialists are shown in table 4, with the number of specialists in New York in 1968.

Although the dental society districts do not correspond exactly to OPC regions, the reports of dental society officers tended to substantiate the estimates of local general practitioners. For example, District IV comprises several counties in the St. Lawrence OPC region. In agreement with many local practitioners, two of the four dental society officers from District IV indicated that there is a shortage of dentists in the area. Similarly, the impression that certain areas of Metropolitan New York may be oversupplied with dentists was supported to some extent by several dental society officers from New York, the Bronx, Queens, Nassau, and Suffolk counties.

Are dental services readily available to consumers? There appear to be marked regional differences in whether or not a person needing dental care can obtain treatment within a reasonable period of time. As table 5 shows, the mail survey of New York dentists found that 64 percent of the State's general practitioners are usually able to see patients within a week after the patient calls for an appointment, and 96 percent accept new patients.

TABLE 4: Number of Specialists in New York in 1968 and Estimates by Dental Society Officers of the Supply of Specialists in Their District

	Number in 1968[1]	Estimated Supply[2]		
		Need More	Have Enough	Have Too Many
Endodontists	86	28.0%	22.0%	50.0%
Oral pathologists	7	46.5	16.3	37.2
Oral surgeons	235	5.7	38.5	55.8
Orthodontists	548	11.8	51.0	37.2
Pedodontists	44	69.4	12.2	18.4
Periodontists	121	31.4	23.5	45.1
Prosthodontists	41	17.8	20.0	62.2

Sources:

1 Facts About States, Bureau of Economic Research and Statistics, American Dental Association, 1969.

2 Mail survey of New York dental society officers, 1970.

TABLE 5: Usual Waiting Time for Appointments and Acceptance of New Patients by New York General Practitioners

	Waiting Time			
	1 Week or Less	2-3 Weeks	4 Weeks or More	% Accepting New Patients
Nassau-Suffolk	64.8%	29.6%	5.6%	98.6%
New York City	75.8	22.7	1.5	98.4
Mid-Hudson	56.0	37.3	6.7	100.0
Upper Hudson	44.2	40.3	15.5	86.8
Mohawk Valley	38.3	38.4	23.3	95.9
Lake Champlain-Lake George	38.9	36.1	25.0	97.1
St. Lawrence	35.0	42.5	22.5	82.5
Central	50.8	39.4	9.8	95.8
Southern Tier-East	43.7	21.9	34.4	95.4
Southern Tier-West	41.4	34.5	24.1	88.3
Lake Ontario	37.3	49.3	13.4	83.8
Western	43.5	43.6	12.9	88.5
TOTAL N.Y.	64.3	29.5	6.2	96.5

Source: Mail survey of New York dentists, 1970.

However, dentists in the various OPC regions differed strikingly in their capacity to accept new patients and in reported waiting times. Thus, although a large majority of dentists in all areas accept new patients, 18 percent of St. Lawrence dentists and 16 percent of Lake Ontario dentists indicated that they do not accept new patients at the present time. Relatively high proportions of dentists in the Upper Hudson, Southern Tier-West, and Western regions also indicated that they do not accept new patients. Waiting times of 4 weeks or more were reported by 34 percent of Southern Tier-East dentists and by approximately 25 percent of the dentists in the Mohawk Valley, Lake Champlain-Lake George, St. Lawrence, and Southern Tier-West regions. In contrast, virtually all New York City, Nassau-Suffolk, and Mid-Hudson dentists accept new patients, and waiting times are usually minimal. Short waiting times were also reported by dentists in the Central region.

Is the New York dental care system operating at or near capacity? The findings presented in the foregoing sections suggest that in most areas of the State, New York's dental care system is able to meet the current demand for dental services. There is clear evidence of a shortage of dentists in the St. Lawrence region, where 35 percent of the general practitioners feel that more dentists are needed and 18 percent do not accept new patients. However, in each of the 12 OPC regions, the majority of general practitioners reported that their area has enough or too many dentists. At least one-third of the dentists in each region have waiting times of 1 week or less, and very few are unwilling to accept new patients.

Other information collected in the mail survey bears upon the

capacity of the system to accommodate near-term increases in demand. Information was obtained on a number of factors related to the dentist's motivation to expand his practice, including (1) number of patient visits and hours worked per week; (2) preferred size of patient load; (3) auxiliary utilization; and (4) age. Age is an important factor to consider in the present context, since several studies have shown that older dentists tend to work fewer hours and are less likely to employ auxiliaries or to want to expand their practice (cf. 9-12).

Number of patient visits and hours worked per week. The mail survey found that the average New York general practitioner has 61 patient visits and works 37 hours during an average week (see table 6).[5] It should be pointed out, however, that these overall findings on dental productivity reflect an anomalous situation in New York City. As may be seen in table 6, New York City has the highest proportion of dentists working 40 hours or more (53 percent), with the lowest median number of patient visits (55 per week). Outside of New York City, dentists see approximately 65-70 patients a week and, in most areas, about one-third work 40 or more hours.

Preferred size of patient load. Dentists in the mail survey were asked whether they would like to have more patients, fewer patients, or the same number that they have at present (see table 7). It is of considerable interest that 37 percent of New York general practitioners want more patients, and that the proportion wanting more is greater

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[5] New York dentists worked an average of 39 hours per week in 1966, according to a survey of dentists licensed in New York (10).

TABLE 6: Number of Patient Visits and Hours Worked per Week by New York General Practitioners

	Patient Visits		Hours Worked	
	Median Number of Visits	% Seeing 80 or More Patients	Median Number of Hours	% Working 40 or More Hours
Nassau-Suffolk	67	31.1%	38	40.8%
New York City	55	24.5	40	53.1
Mid-Hudson	65	32.9	37	38.4
Upper Hudson	68	36.1	37	35.5
Mohawk Valley	72	36.5	36	34.7
Lake Champlain-Lake George	64	19.3	36	30.5
St. Lawrence	67	23.7	35	18.4
Central	69	29.2	36	32.9
Southern Tier-East	65	28.3	38	40.6
Southern Tier-West	71	37.0	37	36.6
Lake Ontario	71	38.2	39	46.1
Western	70	37.0	36	31.1
TOTAL N.Y.	61	28.7	37	45.7

Source: Mail survey of New York dentists, 1970.

TABLE 7: Size of Patient Load Preferred by New York General Practitioners

	Want Fewer Patients	Want Same Number	Want More Patients
Nassau-Suffolk	8.5%	50.7%	40.8%
New York City	6.1	53.0	40.9
Mid-Hudson	12.0	50.7	37.3
Upper Hudson	17.1	63.2	19.7
Mohawk Valley	9.5	65.8	24.7
Lake Champlain-Lake George	11.1	63.9	25.0
St. Lawrence	22.5	67.5	10.0
Central	7.0	59.2	33.8
Southern Tier-East	13.6	63.7	22.7
Southern Tier-West	18.6	52.6	28.8
Lake Ontario	14.3	54.5	31.2
Western	16.1	59.7	24.2
TOTAL N.Y.	9.0	54.0	37.0

Source: Mail survey of New York dentists, 1970.

than the proportion wanting fewer in all areas except the St. Lawrence region. Thus, given the present distribution of dentists, the system has some reserve capacity to provide more patients with dental care.

In addition, the findings presented in table 7 strongly suggest that any existing inadequacies in the availability of dental services are attributable to maldistribution rather than to a statewide shortage of dentists. The most recent count of New York dentists indicated that 77 percent of the State's licensed dentists are located in New York City, Nassau-Suffolk, and Mid-Hudson. Since approximately 40 percent of the general practitioners in these three regions want more patients than they have now, it can be estimated that there are roughly 4,200 dentists in these areas who would like to have more patients, representing nearly one-third of all licensed dentists in the State.

Auxiliary utilization. It is generally recognized that dental productivity can be maximized through the effective utilization of auxiliary personnel. Hygienists contribute directly to dental output by performing routine dental procedures, while other auxiliaries may improve overall efficiency.

Whether or not a dentist employs auxiliaries is undoubtedly related to the size of practice desired by the individual dentist and to the demand for his services. The 1966 New York Board of Dental Examiners survey (10) found that 62 percent of licensed New York dentists employed auxiliary personnel, with 53 percent employing dental assistants and 14 percent employing hygienists. At that time, New York dentists employed auxiliaries less frequently than dentists in most other large urban states. Surveys of licensed dentists in 10 of the comparison states indicated that during the mid-1960's the

proportion of dentists employing auxiliaries ranged from 56 percent in Pennsylvania to 70 percent or above in Connecticut, Indiana, Michigan, Ohio, Texas, and Wisconsin; information was not available for California (10).

The results of the 1970 mail survey of New York dentists suggest that auxiliary employment may have increased among New York dentists since the 1966 Board of Dental Examiners survey. According to the 1970 survey, 73 percent of New York's general practitioners employ one or more auxiliaries on either a full-time or part-time basis; 63 percent employ dental assistants; and 22 percent employ hygienists (see table 8). As table 8 shows, auxiliaries are employed most frequently by dentists in regions with relatively unfavorable dentist-to-population ratios (e.g., the Mohawk Valley, St. Lawrence, Central, Southern Tier-East, Southern Tier-West, and Lake Ontario regions), and least frequently in New York City and the Nassau-Suffolk region.

Age. Age is an important factor in evaluating dental manpower supplies, since areas with high proportions of older dentists may suffer from replacement problems. In addition, older dentists work fewer hours than younger dentists and are less likely than younger dentists to employ auxiliaries, to accept new patients, or to want to expand their practice (9-12).

The available evidence indicates that New York State has an above-average proportion of older dentists, and that the proportion of older dentists may be increasing in some regions. According to information compiled by the American Dental Association from the 1964 American Dental Directory (13), the median age of New York dentists was 49 years. Median ages in the 11 comparison states ranged from 42 to 51, and the

TABLE 8: Employment of Dental Auxiliaries by New York General Practitioners[1]

	% With Auxiliaries[2]	% With Assistants	% With Hygienists
Nassau-Suffolk	71.0%	56.5%	17.4%
New York City	67.7	60.6	13.6
Mid-Hudson	82.4	76.0	24.0
Upper Hudson	80.3	65.3	50.6
Mohawk Valley	91.8	78.1	38.7
Lake Champlain-Lake George	83.3	69.4	38.9
St. Lawrence	87.5	75.0	42.5
Central	88.7	76.1	42.2
Southern Tier-East	86.4	68.2	57.5
Southern Tier-West	88.3	78.3	46.6
Lake Ontario	85.7	62.3	59.7
Western	76.7	54.8	25.8
TOTAL N.Y.	73.4	62.7	22.3

Source: Mail survey of New York dentists, 1970.

[1] Percent with one or more auxiliaries employed either full-time or part-time.

[2] Auxiliaries include receptionists, secretaries, dental assistants, hygienists, laboratory technicians, and any other auxiliary personnel employed by the dentist.

national average was 45. Similarly, the 1966 New York Board of Dental Examiners survey (10) found that the median age of active licensed dentists was 49, with 35 percent aged 55 or over.

The mail survey which was conducted in 1970 for the present project found that 33 percent of New York general practitioners are under 45 years of age, 30 percent are between 45 and 54, and 37 percent are 55 or older, with a median age of 50 (see table 9). Table 9 compares information from the 1966 Board of Dental Examiners survey and the 1970 mail survey of New York dentists. It will be seen that New York City and the Lake Champlain-Lake George and St. Lawrence regions had the highest proportions of older dentists in both 1966 and 1970, and that the proportion of older dentists in these areas appears to have increased. The proportion of older dentists also seems to be increasing in the Nassau-Suffolk, Upper Hudson, and Southern Tier-East regions. At present, the Mid-Hudson and Lake Ontario regions have the highest proportions of dentists under 45.

Summary

Although New York State has the highest overall dentist-to-population ratio in the country, there are wide regional differences in the availability of dental services. Since considerable variation must also exist within OPC regions, it should be realized that overall findings for any given OPC region do not necessarily give an accurate picture of conditions for residents of all areas or neighborhoods within the region. In one study done in the Boston Standard Metropolitan Statistical Area (11), it was found that dentists were concentrated in high socioeconomic status areas where the demand for their services has

TABLE 9: Age Distribution of New York Dentists in 1966 and 1970

	% 55 Years & Over in 1966[1]	1970[2] Under 45 Years	45-54 Years	55 Years & Over
Nassau-Suffolk	18.3%	39.5%	33.8%	26.7%
New York City	37.0	25.7	30.3	44.0
Mid-Hudson	30.1	49.3	20.0	30.7
Upper Hudson	29.7	28.5	33.8	37.7
Mohawk Valley	31.0	30.2	47.9	21.9
Lake Champlain-Lake George	36.3	33.3	25.0	41.7
St. Lawrence	38.4	20.0	32.5	47.5
Central	24.8	40.9	31.0	28.1
Southern Tier-East	16.2	40.8	25.8	33.4
Southern Tier-West	36.0	36.6	25.0	38.4
Lake Ontario	28.4	44.1	29.9	26.0
Western	36.0	37.1	35.5	27.4
TOTAL N.Y.	35.0	32.8	30.3	36.9

Sources: 1
1966 Survey of Dentists Licensed in New York, New York State Board of Dental Examiners and the American Association of Dental Examiners, 1968.

2
Mail survey of New York dentists, 1970.

been greatest, and that poverty areas tended to have more older dentists with less capacity to provide service. Similarly, dentists are probably in relatively short supply in New York City's poverty areas, despite the highly favorable dentist-to-population ratio in the city as a whole.

Table 10 summarizes the key findings presented in chapter 3. The 12 OPC regions were ranked with respect to favorability on each of the six variables related to the supply and availability of dental care: (1) dentist-to-population ratio (1 = highest ratio); (2) estimated supply of dentists (1 = highest proportion of general practitioners estimating enough or too many dentists); (3) waiting time (1 = highest proportion with an average waiting time of 1 week or less); (4) acceptance of new patients (1 = highest proportion accepting new patients); (5) preferred patient load (1 = highest proportion wanting more patients); and (6) age (1 = highest proportion under 45).

The findings summarized in table 10 strongly suggest that existing inadequacies are attributable to maldistribution rather than to a statewide shortage of dentists. Thus, it will be seen that New York City and the Nassau-Suffolk and Mid-Hudson regions may be oversupplied with dentists. The Central region appears to have an adequate supply of dentists, despite the area's low dentist-to-population ratio.

In contrast, the St. Lawrence region is seriously undersupplied with dentists. Conditions are also relatively unfavorable in several other areas, including the Lake Champlain-Lake George and Southern Tier-West regions. Since these three regions had unusually high proportions of older dentists in both 1966 and 1970, particularly severe shortages could develop in the future.

TABLE 10: OPC Regions Ranked by Favorability of Dental Supply Conditions

	D:P	Estimated Supply	Waiting Time	New Patients	Patient Load	Age
Nassau-Suffolk	2	4	2	2	2	5
New York City	1	1	1	3	1	11
Mid-Hudson	3	2	3	1	3	1
Upper Hudson	6	6	5	10	11	10
Mohawk Valley	7	5	10	5	8	9
Lake Champlain-Lake George	10	9	9	4	7	8
St. Lawrence	12	12	12	12	12	12
Central	8	3	4	6	4	3
Southern Tier-East	9	10	6	7	10	4
Southern Tier-West	11	11	8	9	6	7
Lake Ontario	5	8	11	11	5	2
Western	4	7	7	8	9	6

Note: 1 = most favorable supply conditions among the 12 OPC regions,
12 = least favorable supply conditions.

Sources: See tables 2, 3, 5, 7, and 9.

Given the present distribution of dentists, however, New York's dental care system appears to have some reserve capacity to accommodate moderate near-term increases in demand. In all OPC regions except St. Lawrence, the proportion of dentists who want more patients is greater than the proportion wanting fewer. In addition, as dental demand increases in the future, it may be possible to increase productive capacity through more widespread auxiliary utilization.

CHAPTER 4: TRENDS IN THE DEMAND FOR DENTAL SERVICES

As was mentioned in the introduction to this report, the Nation's demand for dental care is expected to increase more rapidly than the supply of dental services, due to population growth and growth in per capita demand. Thus, growth in demand may produce an increasing stress on New York's dental care system, unless the State's supply of dental services increases at a commensurate rate. The following sections present information on population growth, per capita demand, and projected total demand for New York State. Later chapters discuss trends in dental supply and the problem of meeting an increased care demand.

Population Growth. According to projections made by the Division of Dental Health of the U.S. Public Health Services (6), the population of New York will increase somewhat less rapidly than that of the Nation as a whole from 1970 to 1985 (see appendix E). Proportionately greater population increases are predicted in nine of the 11 comparison states; only Massachusetts and Pennsylvania are expected to grow less rapidly.

The New York Office of Planning Coordination (14) has estimated that the population of the State will increase by approximately 5-6 percent every 5 years from 1970 to 2020. Population projections for the 12 OPC regions are presented in table 11. It will be seen that the population of New York City is expected to increase only minimally. For the periods 1970-80 and 1980-2000, the highest growth rates are predicted for the Nassau-Suffolk and Mid-Hudson regions. Large increases are also expected in the Upper Hudson, Central, Southern Tier-East, and Lake Ontario regions. Rapid population expansion is not anticipated until 1980-2000 in the Mohawk Valley, Lake Champlain-Lake George,

TABLE 11: 1970-2020 Population Projections by OPC Region

	1970	1980	2000	2020	% Change 1970-80	% Change 1980-2000	% Change 2000-20
Nassau-Suffolk	2,599,248	3,259,373	5,219,097	6,740,864	25.4%	60.1%	29.2%
New York City	8,162,094	8,302,869	8,538,800	8,666,120	1.7	2.8	1.5
Mid-Hudson	1,937,771	2,463,584	3,822,706	5,704,440	27.1	55.2	49.2
Upper Hudson	846,807	962,018	1,261,911	1,661,214	13.6	31.2	31.6
Mohawk Valley	471,094	510,716	615,185	743,586	8.4	20.4	20.9
Lake Champlain-Lake George	223,695	240,153	291,077	351,559	7.4	21.2	20.8
St. Lawrence	282,663	297,682	359,885	439,167	5.3	20.9	22.0
Central	774,853	892,334	1,189,547	1,565,156	15.2	33.3	31.6
Southern Tier-East	503,511	565,817	729,873	937,074	12.4	29.0	28.4
Southern Tier-West	507,453	537,377	619,432	720,626	5.9	15.3	16.3
Lake Ontario	1,055,030	1,204,757	1,557,809	1,963,049	14.2	29.3	26.0
Western	1,386,456	1,520,158	1,873,499	2,290,630	9.6	23.2	22.3
TOTAL N.Y.	18,750,675	20,756,838	26,078,821	31,783,485	10.7	25.6	21.9

Source: Demographic Projections for New York State Counties to 2020 A.D., Office of Planning Coordination, June 1968.

St. Lawrence, Southern Tier-West, and Western regions; relatively moderate increases are predicted for these areas during the present decade.

Per capita demand. The number of dental visits made annually per person may be used as an index of the realized per capita demand for dental care in the population. Using information from the mail survey of New York dentists, it was possible to estimate dental visits per capita during 1970 for the 12 OPC regions. These estimates are shown in table 12.

As might be expected, the highest estimates of visits per capita were found for New York City and the Nassau-Suffolk and Mid-Hudson regions. On the average, persons in the St. Lawrence area made the fewest dental visits in 1970. Other regions with relatively few visits per capita included Lake Champlain-Lake George, Central, Southern Tier-East, and Southern Tier-West.

There are several factors that may affect per capita demand, including changes in the financial availability of dental services and changes in the prevalence of dental disease. These are discussed below.

Changes in financial availability. Dental demand as measured by visits per capita has been shown to be related to both income and education (3). Thus, increased demand may be anticipated as income and educational levels rise. In addition, the per capita demand for dental care will unquestionably increase as public and private dental insurance coverage is extended to a larger proportion of the population. As adequate dental care becomes financially feasible for more persons, many who have not sought care in the past will do so, and many who have

TABLE 12: 1970 Dental Visits per Capita in New York

	Visits per Capita
Nassau-Suffolk	2.48
New York City	2.30
Mid-Hudson	2.41
Upper Hudson	1.77
Mohawk Valley	1.79
Lake Champlain-Lake George	1.38
St. Lawrence	1.09
Central	1.61
Southern Tier-East	1.49
Southern Tier-West	1.51
Lake Ontario	2.03
Western	2.01
TOTAL N.Y.	2.18

Sources: Based on information from the 1970 mail survey of New York dentists and the 1970 U.S. Census.

obtained care primarily on an emergency basis will seek regular care. Furthermore, the potential for increased demand resulting from widespread insurance coverage is compounded by the fact that persons who have not received adequate care often have a large backlog of unmet needs.

In the mail survey of New York dentists, dentists were asked to estimate the percent of their patients who pay by personal payment, through a prepayment plan, or through Medicaid. As table 13 shows, 82 percent of the State's general practitioners received personal payments from at least three out of four patients; 37 percent of the general practitioners have no prepayment patients; and 54 percent have no Medicaid patients.

Although personal payment is still the principal method of payment for New York dental patients, widespread insurance coverage can be predicted in the near future. In the mail survey of U.S. dental school deans, respondents were asked to indicate the extent to which participation in prepaid insurance plans will increase between 1970 and 1980. Among the 54 deans answering this question, 26 percent said that they expect a moderate increase, 48 percent expect a considerable increase, and 26 percent a large increase. Similarly, among New York dental society officers, the average estimate of insurance coverage in their district was 55 percent for 1980, compared with a current estimate of 13 percent. Thus, it seems reasonable to assume that dental insurance will become an increasingly important determinant of demand during the 1970's.

Changes in disease prevalence. Although artificial fluoridation

TABLE 13: Methods of Payment Among Dental Patients of New York General Practitioners

	% With 3/4 Personal Payment Patients[1]	% With No Prepayment Patients	% With No Medicaid Patients
Nassau-Suffolk	74.3%	33.3%	36.2%
New York City	80.0	37.5	68.8
Mid-Hudson	90.6	40.5	48.6
Upper Hudson	86.8	34.2	34.2
Mohawk Valley	76.4	23.3	29.2
Lake Champlain-Lake George	80.6	63.9	30.6
St. Lawrence	81.6	47.4	36.8
Central	88.7	35.7	32.9
Southern Tier-East	90.8	42.2	27.7
Southern Tier-West	81.6	43.3	36.7
Lake Ontario	93.6	36.4	48.1
Western	91.9	40.3	37.1
TOTAL N.Y.	82.2	37.3	54.3

Source: Mail survey of New York dentists, 1970.

[1] Percent reporting that at least 75 percent of their patients are personal payment patients.

of public water supplies may be expected to have some impact on future dental demand, the extent of the impact of fluoridation on the total demand for dental care cannot be predicted. There have been some indications that while fluoridation reduces unmet care needs, it does not reduce dental demand (15). In addition, it has been suggested that since fluoridation prevents loss of teeth, the ultimate effect may be to increase demand by increasing the number of teeth left to be treated (3).

There is little naturally fluoridated water in New York. However, in 1969, 65 percent of the State's residents were using artificially fluoridated public water supplies (see table 14). New York ranked 16th among all states in the percent of the public water supply that was fluoridated in 1967 (16).

It seems probable that fluoridation will be widespread by 1980. The mail survey of New York dental society officers indicated that 61 percent expect that the percent of fluoridated public water supplies in their district will increase by 1980, while 9 percent predict a decrease. Similarly, in the mail survey of the U.S. dental school deans, 11 percent predicted a slight increase by 1980 in the fluoridation of water supplies, 82 percent a moderate-to-considerable increase, and 7 percent expect a large increase.

At present, dental researchers are seeking to develop new methods of caries control. When asked about the possibility of a breakthrough in this area by 1980, 13 percent of U.S. dental school deans said that a breakthrough is unlikely or that the possibility is slight; 78 percent said that there is a moderate-to-good possibility; and 9 percent

TABLE 14: Percent of New York's Population With Fluoridated Water in 1969

	% With Fluoridation
Nassau-Suffolk	2.3%
New York City	91.0
Mid-Hudson	50.7
Upper Hudson	17.6
Mohawk Valley	40.1
Lake Champlain-Lake George	20.6
St. Lawrence	38.0
Central	43.3
Southern Tier-East	6.6
Southern Tier-West	34.6
Lake Ontario	68.5
Western	90.8
TOTAL N.Y.	65.1

Sources: Based on information from Fluoridation Census 1969, New York State Department of Health, 1970, and Demographic Projections for New York State Counties to 2020 A.D., Office of Planning Coordination, June 1968.

said that the possibility is excellent.

Projected total demand. Future demand for dental care will undoubtedly depend upon a number of factors, many of which cannot be foreseen or accurately predicted. It can be assumed that total demand will increase as a function of population growth, and that per capita demand will increase as income and education levels rise and dental insurance coverage is extended to a larger proportion of the population.

Because of the complexity of the problem, however, long-term predictions of dental demand should be made and interpreted with caution. The impact of widespread fluoridation cannot be estimated with precision at the present time, nor can the possible development of new methods of dental disease prevention or control be evaluated. Erroneous estimates of predictor variables, or failure to take important variables into account, could well result in large errors in any attempt to estimate future demand for dental care.

Cole and Cohen (3) have made several estimates of per capita dental demand, expressed in visits per capita, for the Nation in 1980. Given certain sets of assumptions concerning income, education, and participation in organized dental care programs, they estimate an average of 2.48 or 2.82 visits per capita in 1980. Based on these estimates and assuming a population increase of 11 percent in New York State during the period 1970-80, it is possible to estimate that the total demand for dental care in New York may increase by 27 percent - 43 percent between 1970 and 1980. It must be emphasized, however, that these are very rough estimates, involving a number of highly questionable assumptions. In particular, the assumptions made by Cole and Cohen with

respect to income, education, and participation in organized care programs may not prove to be valid, nor can it be assumed that estimates of per capita demand for the Nation are necessarily applicable to New York State. These estimates employing the method of estimation used by Cole and Cohen are mentioned only to give an indication of an educated guess concerning possible increases in dental demand in New York State.

Summary

The population of New York is expected to increase by 11 percent during the 1970's, and by 26 percent between 1980 and 2000. The largest population increases are predicted for the following OPC regions: Nassau-Suffolk, Mid-Hudson, Upper Hudson, Central, Southern Tier-East, and Lake Ontario.

In addition to the fact that population growth will contribute to total demand, it may be anticipated that the per capita demand for dental care will increase as public and private insurance coverage is extended to a larger segment of the population. Furthermore, since persons who have not received adequate dental care often have a large backlog of unmet needs, future increases in per capita demand may be greatest in those regions with relatively few dental visits per capita in the past. As indexed by visits per capita in 1970, it would appear that existing unexpressed needs may be greatest in the following regions: Lake Champlain-Lake George, St. Lawrence, Central, Southern Tier-East, and Southern Tier-West. Unless the supply of dental services increases to compensate for rising demand, critical situations could develop during the 1970's in areas with significant backlogs of unmet needs or in

those which undergo rapid population expansion.

Because of the complexity of the problem, however, quantitative estimates of future dental demand in New York State cannot be made with satisfactory precision at the present time. The impact of widespread fluoridation cannot be predicted, nor can the possibility of developing new methods of dental disease prevention and control be meaningfully evaluated. Nevertheless, it can be assumed that total demand will increase as a function of population growth, and that per capita demand will increase as health care expectations rise and dental insurance coverage is increased.

CHAPTER 5: TRENDS IN THE SUPPLY OF DENTISTS

The present relationship between dental supply and demand would be maintained only if the supply of dental services were to increase at approximately the same rate as the demand for care. As was discussed in chapter 4, population growth and the extent of unmet dental needs must weigh heavily in any consideration of potential demand. The following sections examine the relationship between population growth and the supply of dentists from 1960 to 1968.

Dental supply in the U.S. As may be seen in table 15, the population of the United States increased by 12 percent between 1960 and 1968. Since the total number of non-Federal dentists increased by 11 percent during this period, the dentist-to-population ratio for the country as a whole remained almost constant.[6]

From 1960 to 1968, the dentist-to-population ratio decreased in favorability by 4 percent in New York State, and by 4-9 percent in five other large urban states with above average 1960 dentist-to-population ratios (Connecticut, Illinois, New Jersey, Pennsylvania, and Wisconsin). Both the absolute number of dentists and the dentist-to-population ratio increased markedly in Texas, the comparison state with the least favorable 1960 dentist-to-population ratio and the fourth highest rate of population growth. Above average increases in numbers of dentists also occurred in the three states with the most rapid population increases (California, Connecticut, and New Jersey); the number of

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[6] Appendix E presents numbers of dentists by state.

TABLE 15: 1960-68 Changes in Population and Dental Supply by State

		1960-68		
	1960 D:P[1]	% Change in Pop.	% Change in Dentists	% Change in D:P
New York	1:1,180	9.0%	4.5%	-4.1%
California	1,539	28.6	28.2	-0.3
Connecticut	1,362	21.5	11.1	-8.6
Illinois	1,570	8.2	-0.3	-7.9
Indiana	2,121	7.4	4.4	-2.8
Massachusetts	1,390	8.6	8.9	0.3
Michigan	1,957	5.5	11.5	5.7
New Jersey	1,507	19.0	14.0	-4.2
Ohio	2,012	9.9	7.6	-2.2
Pennsylvania	1,614	2.8	-4.0	-6.6
Texas	2,871	12.0	27.8	14.2
Wisconsin	1,546	7.7	0.5	-6.6
TOTAL U.S.	1,814	11.5	10.8	-0.6

Source: Distribution of Dentists in the United States by State, Region, District, and County, Bureau of Economic Research and Statistics, American Dental Association, 1961 and 1969.

[1] Total non-Federal dentists.

dentists decreased in Pennsylvania, the comparison state with the smallest population increase. Thus, on a nationwide basis, there is some tendency for dental supply to accommodate to population changes.

Dental supply in New York. Table 16 presents information on population and dental supply changes in New York State between 1960 and 1968.[7] During this period, the dentist-to-population ratio decreased by 4 percent or more in six OPC regions: New York City, the Mohawk Valley, Lake Champlain-Lake George, Central, Southern Tier-East, and Southern Tier-West. Large increases in numbers of dentists occurred in the Nassau-Suffolk and Mid-Hudson regions, the two areas with the greatest population increases. Since the number of dentists in New York City actually decreased, there appears to have been some accommodation of supply to demand within the highly urbanized area comprising Metropolitan New York and the Mid-Hudson region.

No clear pattern was found in the relationship between dental supply and demand in the smaller OPC regions. The dentist-to-population ratio was approximately maintained or somewhat improved in the Upper Hudson, St. Lawrence, Lake Ontario, and Western regions. Although numbers of dentists increased slightly in the Lake Champlain-Lake George, Central, and Southern Tier-East regions, supply failed to keep pace with population increases in these areas. The supply of dentists decreased in the Mohawk Valley, despite moderate population

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[7] Appendix E presents numbers of dentists by OPC region.

TABLE 16: 1960-68 Changes in Population and Dental Supply by OPC Region

		1960-68		
	1960 D:P[1]	% Change in Population	% Change in Dentists	% Change in Population
Nassau-Suffolk	1:1,253	25.9%	34.4%	6.7%
New York City	950	4.2	-4.3	-8.1
Mid-Hudson	1,151	19.9	19.0	-0.8
Upper Hudson	1,790	7.1	6.7	-0.5
Mohawk Valley	1,859	8.7	-5.7	-13.3
Lake Champlain-Lake George	1,883	15.0	7.6	-6.5
St. Lawrence	2,753	-0.5	5.9	6.4
Central	1,813	13.6	6.6	-6.2
Southern Tier-East	1,854	8.8	3.7	-4.7
Southern Tier-West	2,116	3.0	-2.2	-5.0
Lake Ontario	1,507	12.3	15.4	2.7
Western	1,543	-0.4	6.2	6.6
TOTAL N.Y.	1,180	9.0	4.5	-4.1

Source: Distribution of Dentists in the United States by State, Region, District, and County, Bureau of Economic Research and Statistics, American Dental Association, 1961 and 1969.

[1] Total non-Federal dentists.

growth; a small decrease also occurred in the Southern Tier-West region.

Summary

From 1960 to 1968, New York's dentist-to-population ratio decreased by 4 percent. Similar decreases occurred in other large urban states with relatively favorable dentist-to-population ratios.

Although increases in dental supply compensated for population growth in the Nassau-Suffolk and Mid-Hudson regions, supply failed to keep pace with population increases in some of the smaller OPC regions: the Mohawk Valley, Lake Champlain-Lake George, Central, Southern Tier-East, and Southern Tier-West. Since dentists are already in short supply in several of these regions, it may be anticipated that the imbalance between supply and demand will increase if present trends continue.

CHAPTER 6: SOURCES OF NEW YORK'S SUPPLY OF DENTISTS

Although New York State has for some time relied rather heavily on out-of-state schools to provide dental training for its residents, the majority of the State's dentists have been graduates of New York schools. Thus, the 1966 Board of Dental Examiners survey (10) found that 63 percent of New York dentists had been trained at New York dental schools: 37 percent at New York University, 14 percent at Columbia, and 12 percent at Buffalo. Among out-of-state schools, the University of Pennsylvania contributed the largest number of graduates to New York's supply of dentists (12 percent).

Furthermore, most graduates of New York schools locate their practices in New York State. According to an American Dental Association study (13), 84 percent of dentists who had graduated from Buffalo were practicing in New York in 1963, and 79 percent of Columbia and New York University graduates were located in New York. In contrast, only 54 percent of all dentists in the United States were practicing in the state where they had attended dental school.

The following sections present detailed information on trends of applications, enrollment, and the production of dental graduates. Attention is also given to factors affecting choice of practice location. A special study was done to determine the extent to which choice of practice location is related to place of residence at the time of enrollment in dental school, or to the location of the dental school attended.

Applications and enrollment of New York residents. As may be seen in table 17, both the number of applications to dental schools in the

TABLE 17: Dental School Applications and Enrollment of New York Residents in 1962, 1963, and 1965-69[1]

	1962	1963	1965	1966	1967	1968[2]	1969
Total Applicants in U.S.	6,566	8,969	9,988	10,177	10,264	9,037	10,325
% from N.Y.	11.8%	16.2%	13.8%	13.7%	14.3%	13.5%	11.9%
Total Freshmen in U.S.	3,680	3,770	3,806	3,942	4,200	4,203	4,355
% from N.Y.	12.1%	11.8%	12.3%	12.1%	13.0%	13.9%	12.2%
New York Resident Applicants	775	1,455	1,383	1,393	1,472	1,217	1,230
% of N.Y. Applicants Enrolled as Freshmen	57.5%	30.6%	33.8%	34.2%	37.1%	48.0%	43.1%
% of N.Y. Freshmen Enrolled in N.Y. Dental Schools	57.8%	55.7%	50.0%	50.0%	48.4%	45.5%	48.7%

Source: Applicants to Dental School, Council on Dental Education, American Dental Association.

[1] Information was not available for 1964.

[2] Beginning in 1968, a new definition of "applicant" was used.

United States and the number of freshmen enrolled have increased during recent years.[8] During the 1960's, New York residents comprised 12-16 percent of all dental school applicants, and obtained 12-14 percent of the freshman places. Thus, New Yorkers have been at least as successful as applicants from other states in gaining admission to dental school.

The ease with which this success has been achieved is brought into question, however, by the fact that New York residents made an average of 7.45 applications in 1968 and 8.35 in 1969, ranking second and third among all states in number of applications (17). The implication is that New Yorkers may need to apply to more schools in order to be assured of admission, and that many may not get their first choice. It should also be noted that over half of recent New York applicants have not been admitted to dental schools.

Finally, as table 17 indicates, there has been an increasing reliance on out-of-state dental schools. Thus, more than half of New York's dental school freshmen during the late 1960's were enrolled in out-of-state schools.

New York dental schools. Table 18 presents numbers of applicants, freshmen, and graduates for the three New York dental schools during the academic years 1960-61 through 1970-71.

As may be seen in table 18, the number of applicants to New York

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[8] Data on numbers of applicants and on the percent of applicants admitted should be interpreted with caution. The Council on Dental Education of the American Dental Association changed its criteria for defining an applicant after 1967, and there may have been other changes or inconsistencies in definition.

TABLE 18: Applications to Buffalo, Columbia, and New York University, Enrollment of New York Residents, and Number of Graduates, 1960-70

		Freshmen		
	Total Applicants	Total	% From N.Y.	Total Graduates
Buffalo				
1960-61	226	67	95.5%	60
1961-62	208	69	98.6	46
1962-63	300	68	92.6	59
1963-64	390	70	90.0	54
1964-65	478	72	95.8	44
1965-66	587	71	93.0	59
1966-67	575	70	92.8	62
1967-68	611	77	94.8	64
1968-69	612	78	94.9	65
1969-70	665	75	97.3	61
1970-71	803	80	98.8	*
Columbia				
1960-61	230	39	71.8%	38
1961-62	173	37	78.4	37
1962-63	213	41	82.9	33
1963-64	251	40	72.5	31
1964-65	239	40	77.5	26
1965-66	321	32	78.1	27
1966-67	339	36	77.8	31
1967-68	402	44	72.7	29
1968-69	444	46	78.3	33
1969-70	434	45	80.0	33
1970-71	533	47	80.8	*
New York University				
1960-61	410	170	88.2%	164
1961-62	562	170	88.9	152
1962-63	656	170	90.6	159
1963-64	773	171	91.8	162
1964-65	777	171	92.4	153
1965-66	815	172	86.6	153
1966-67	870	173	85.5	164
1967-68	870	174	91.0	150
1968-69	1,020	175	88.6	161
1969-70	1,100	175	84.6	163
1970-71	1,200	179	89.4	*

*Actual figures not yet available for 1970-71.

Source: Personal communications from Buffalo, Columbia, and New York University.

dental schools has tripled during the decade. From 1960 to 1970, the number of applicants increased by 132 percent at Columbia, 193 percent at New York University, and 255 percent at Buffalo. However, the total number of freshman places did not begin to increase until 1967, so that the number of graduates produced by New York schools has remained approximately constant.

New York residents have traditionally filled almost 90 percent of the openings in New York's dental schools (see table 18). Buffalo, which has been the only state-supported school, has tended to admit the highest proportion of New York residents as freshmen, and Columbia has admitted the fewest State residents.

Out-of-state dental schools. Information from several sources indicates that New York dentists are increasingly likely to receive their training at out-of-state dental schools. Thus, the proportion of New York dental school freshmen enrolled at out-of-state schools rose from 42 percent in 1962 to over 50 percent during the late 1960's (see table 17).

Similarly, there has been an increase during recent years in the proportion of out-of-state graduates among dentists who are newly licensed to practice in New York State. Table 19 presents information on newly licensed dentists in New York. It must be noted that the figures shown in table 19 for 1969 and 1970 cannot be compared with information from previous years, since 1969 was the first year of participation with the North East Regional Board of Dental Examiners and applications for licensure have probably been affected by this

TABLE 19: Number of Newly Licensed Dentists in New York and Percent Graduated From New York Dental Schools, 1963-70

	Total New Dentists	% From N.Y. Schools
1963	455	56.3%
1964	449	51.7
1965	446	48.6
1966	464	43.5
1967	531	45.8
1968	562	39.8
1969[1]	366	49.4
1970	296	49.7

Source: Personal communication from Dr. Donald F. Wallace, New York Board of Dental Examiners.

[1] Beginning in 1969, regulations concerning application for licensure changed through participation in the North East Regional Board of Dental Examiners.

change.[9] However, approximately 50 percent of the dentists who were newly licensed in 1969 and 1970 were trained at out-of-state schools, and there is evidence from previous years of an increasing reliance on out-of-state training.

The out-of-state schools attended most frequently by New Yorkers are Georgetown, Howard, Pennsylvania, Temple, and Tufts. Smaller numbers of New York residents attended Farleigh-Dickinson, the New Jersey College of Dentistry, and the University of Pittsburgh. Appendix E includes detailed information on applications and enrollment for these eight schools.

The extent of New York's reliance on the five most frequently attended out-of-state schools is shown by the fact that these schools enrolled a total of 174 New York residents in their 1969 freshman classes. Thus, New York is in a vulnerable position, should these schools adopt policies of admitting fewer nonresidents. As may be seen in the detailed table presented in appendix E, total applications to the eight schools attended by New Yorkers have increased sharply during recent years, and three schools drew somewhat higher proportions of their 1968 and 1969 freshman classes from within their own states than

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9 In this regional approach to clinical examinations for licensure, the New York Board participates with nine other states in conducting examinations. The results are filed at a central office, and the candidate may use the results to apply for licensure at any time within 5 years after the examination. Given this assurance of extended credit, it is possible that those who do not intend to practice immediately in the State may delay application. This may account for the recent decrease in New York licensees and for the decreased proportion from schools outside of the State.

in the past (Temple, the New Jersey College of Dentistry, and the University of Pittsburgh). In most cases, however, the percent of freshmen enrolled from within the State has remained relatively constant.

Trends in dental school enrollment. Table 20 compares information on the average number of freshmen enrolled in dental schools during the years 1962-63 with the average number enrolled in 1968-69.[10] It will be seen that during this period dental school enrollment among New Yorkers increased at a more rapid rate than for the Nation as a whole (25 percent versus 15 percent). However, there has been a negligible increase in the number of freshman positions at New York schools. Whereas freshman enrollment at the five out-of-state schools most frequently attended by New Yorkers increased by 28 percent, enrollment at New York schools increased by only 6 percent. Thus, the 25 percent increase in enrollment of New York residents can be attributed almost entirely to the large increase (53 percent) in the number of New Yorkers attending out-of-state schools.

The evidence strongly suggests that a significant number of qualified applicants attend out-of-state schools because of the shortage of freshman positions at New York schools and because of lower tuition and living expenses.

Among the 11 large urban comparison states, only Connecticut and New Jersey had less favorable ratios of freshman places to population

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[10] Two-year averages were used in order to reduce the effects of year-to-year fluctuations in enrollments.

TABLE 20: Changes in Freshman Enrollment From 1962-63 to 1968-69.

	Average Number per Year		
	1962-63	1968-69	% Change
Total Freshmen in U.S.	3 25	4,279	14.9%
Total at N.Y. schools	280	297	6.3
Total at five out-of-state schools[1]	556	713	28.2
New York Residents	446	557	25.0%
At N.Y. schools	253	262	3.6
At all out-of-state schools	192	295	53.2

Source: Applicants to Dental School, Council on Dental Education, American Dental Association.

[1] Georgetown, Howard, Pennsylvania, Temple, and Tufts.

in 1969 (6, 18). In addition, the deans of New York dental schools indicated in telephone conversations that their schools find it necessary to reject applicants who would make competent dentists; the deans also expressed concern that out-of-state schools may change their policies toward admitting nonresidents. Although no information is available on what happens to applicants who are rejected by New York schools, it seems probable that many do succeed in gaining admission to out-of-state schools.

Choice of practice location. A special study was done to investigate the extent to which practice location is related to place of residence at the time of admission to dental school, and to the location of the school attended (New York State or out-of-state). The study included three groups of dentists: (1) all who were New York residents at enrollment and who graduated from New York dental schools in 1950, 1955, and 1960-65; (2) all out-of-state residents who graduated from New York schools during these years; and (3) all New York residents who graduated during these years from Georgetown, Howard, Pennsylvania, Temple, or Tufts. Names of graduates were furnished by the schools, with place of residence at the time of enrollment for graduates of the New York schools. The 1970 American Dental Directory (4) was used to determine current practice location.

Tables 21 and 22 present the major findings of the study. Among non-Federal dentists who were New York residents at the time of enrollment, 84 percent of New York dental school graduates practice in New York State, and 71 percent of those who graduated from the five out-of-state schools practice in New York. Similarly, it was found that about

TABLE 21: 1970 Practice Location of Dentists Graduated From New York Dental Schools and of New York Residents Graduated From Selected Out-of-State Schools[1]

1970 Location	New York Residents: From New York Schools No.	%	New York Residents: From Out-of-State Schools No.	%	Nonresidents From N.Y. Schools No.	%
Nassau-Suffolk	274	16.6%	101	16.3%	1	0.7%
New York City	643	38.9	132	21.3	16	10.6
Mid-Hudson	164	9.9	71	11.5	2	1.3
Upper Hudson	29	1.8	28	4.5	0	0.0
Mohawk Valley	15	0.9	11	1.7	0	0.0
Lake Champlain-Lake George	10	0.6	3	0.5	0	0.0
St. Lawrence	10	0.6	3	0.5	0	0.0
Central	34	2.1	22	3.6	0	0.0
Southern Tier-East	26	1.6	16	2.6	0	0.0
Southern Tier-West	17	1.0	8	1.3	0	0.0
Lake Ontario	71	4.3	31	5.0	0	0.0
Western	102	6.2	16	2.6	0	0.0
Total N.Y.	1,395	84.5	442	71.4	19	12.6
Total Out-of-State	256	15.5	177	28.6	132	87.4
TOTAL	1,651	100.0	619	100.0	151	100.0

Source: Based on material provided by Buffalo, Columbia, and New York University.

[1] Includes non-Federal dentists who graduated in 1950, 1955, and 1960-65.

Table 22: 1970 Practice Location by Residence at Enrollment for New York Residents Graduated From New York Dental Schools[1]

1970 Location	Residence at Enrollment[2] NYC No.	NYC %	NS or M-H No.	NS or M-H %	LO or W No.	LO or W %	Other N.Y. No.	Other N.Y. %
Same OPC as Residence	604	52.9%	96	59.2%	114	64.7%	69	55.2%
Different OPC								
New York City, Nassau-Suffolk, or Mid-Hudson	324	28.4	40	24.7	9	4.0	8	6.4
Lake Ontario or Western	5	0.4	4	2.5	13	5.8	7	5.6
Other New York	20	1.8	5	3.1	25	11.2	22	17.6
Total New York	953	83.5	145	89.5	191	85.7	106	84.8
Total Out-of-State	188	16.5	17	10.5	32	14.3	19	15.2
TOTAL	1,141	100.0	162	100.0	223	100.0	125	100.0

Source: Based on material provided by Buffalo, Columbia, and New York University.

[1] Includes non-Federal dentists who graduated in 1950, 1955, and 1960-65.

[2] OPC region of residence at enrollment: New York City (NYC), Nassau-Suffolk or Mid-Hudson (NS or M-H), Lake Ontario or Western (LO or W), or other N.Y.

three out of four nonresident graduates of New York schools had returned to their home states. Only 19 of the former nonresidents are currently practicing in New York; all of these are in the New York City, Nassau-Suffolk, and Mid-Hudson regions. Thus, after attending an out-of-state dental school, the large majority of dentists returned to their own state to practice.

The analysis shown in table 22 was done in order to further study the relationship between place of residence at the time of enrollment in dental school and choice of practice location. Since New York's immediate dental manpower problems appear to result primarily from maldistribution, it was felt that it would be of value to examine current practice location among four groups of New York dental school graduates: (1) those originally from New York City; (2) those from two other highly urbanized areas with high dentist-to-population ratios (Nassau-Suffolk and Mid-Hudson); (3) those from two areas with intermediate dentist-to-population ratios (Lake Ontario and Western); and (4) those from all other OPC regions.

As table 22 shows, over half of the dentists in each group currently practice in the same OPC region as their residence at the time of admission to dental school. Although a somewhat higher proportion of Lake Ontario and Western dentists practice in the area of their original residence, the four groups do not differ appreciably in this respect. Similarly, the proportion who have moved out of New York State is approximately the same among the four groups.

Rather striking differences were found, however, among dentists who remained in New York State and now practice in a different OPC

region than that of their original residence. As will be seen in table 22, the large majority of dentists from New York City and the Nassau-Suffolk and Mid-Hudson regions remained in these highly urbanized areas, even when they moved out of their original area of residence. In contrast, very few who were originally from other areas are currently practicing in Metropolitan New York or the Mid-Hudson region. When dentists from less highly urbanized areas moved away from their original residence, they tended to move to another relatively undeveloped area.

Among the 1,081 dentists in the study who are currently practicing in New York City or in the Nassau-Suffolk or Mid-Hudson regions, 700 (65 percent) were originally from the same OPC region, 364 (34 percent) were from another region in or around Metropolitan New York, and only 17 (1 percent) were originally from a less urbanized area. Among the 314 dentists practicing in OPC regions other than Metropolitan New York or Mid-Hudson, 213 (68 percent) were originally from the region in which they practice, 67 (21 percent) were from another similar area, and 34 (11 percent) were from Metropolitan New York or the Mid-Hudson region.

In summary, the study shows that dental school graduates tend to establish their practices in the same region as their residence prior to enrollment, or in an area with somewhat similar characteristics. This general pattern was found regardless of the school attended or year of graduation.

The implication of this finding is clear: if the supply of dental services in regions outside of Metropolitan New York is to be maintained or improved, more dental students must be recruited from these regions,

since they will be the most likely to establish practices in areas where the need for dental resources is greatest.

Finally, it should be mentioned that New York State loses more dentists through migration to other states than are gained through in-migration. For the years 1960 through 1965, the State lost three dentists for every two who moved into New York (19). Since few New Yorkers leave the State, it seems probable that most of those who move out of New York were originally residents of other states.

Summary

In the past, the majority of New York dentists have received their training at dental schools in New York State. However, New York has not kept pace with other states in the rate of expansion of its training facilities. Therefore, as the number of New Yorkers who wish to attend dental school has increased, there has been an increasing reliance on nearby states to provide dental training for New York residents. Over half of all New York dental school freshmen now attend out-of-state schools.

In a study of factors related to choice of practice location, it was found that New York residents who had graduated from selected out-of-state schools were somewhat less likely to practice in New York than those trained at New York schools. Thus, the present reliance on out-of-state training may cost New York the loss of some dentists who would remain in the State to practice if they were able to attend New York schools.

The major finding of this study, however, relates to choice of practice location among New York residents trained within the State.

It was found that nearly all of the 1950, 1955, and 1960-65 graduates of New York dental schools who resided in the Metropolitan New York area at the time of enrollment currently practice in that area. In contrast, those who were originally from less highly urbanized areas either established practices in the same OPC region as their original residence or in a similar region.

This finding has significant implications for dealing with the problem of New York's maldistribution of dentists. One possible course of action that might be taken to ameliorate this problem would be to establish a dental school in a region with few dentists, in the expectation that graduates of the school would tend to remain in the area, and that other dentists might be attracted to practice there by the availability of facilities and colleagues. Evidence from the study does not support the notion that such a plan would be effective: Buffalo graduates who were originally from the Metropolitan New York area located their practices in Metropolitan New York and the Mid-Hudson region with approximately the same high frequency as was found among Metropolitan New Yorkers who attended Columbia or New York University. Thus, there is no evidence that dental school location is, in itself, an important determinant of future practice location.

Since it seems unlikely that significant numbers of urbanites can be encouraged to practice in outlying areas, the most appropriate approach to New York's distribution problem may be to actively recruit students and otherwise encourage careers in dentistry among young people from areas with unfavorable dental supply conditions. This option is discussed in chapter 7.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS: MEETING THE INCREASED DEMAND FOR DENTAL SERVICE

New York State is confronted with two major problems in planning for the future manpower supplies that will be required to meet the future care demands of its residents: (1) the geographic maldistribution of private practitioners in the State and (2) an increasingly great reliance on out-of-state schools to provide dental training for future New York practitioners. Several approaches to meeting these problems are discussed in the present chapter. These recommendations have been developed in consultation with the project's Advisory Committee.

The evidence suggests that New York's primary dental manpower problem is likely to continue to be one of maldistribution, rather than a Statewide shortage of dentists. Table 23 presents projected numbers of New York dentists and dentist-to-population ratios to 1985. It will be seen that a moderate decrease is expected in the State's dentist-to-population ratio, thus continuing the trend of the 1960's. Despite this, however, projected practitioner-to-population ratios for New York are considerably more favorable than the current ratios in the 11 comparison states (cf. table 1).

The maldistribution problem is not unique to the field of dentistry. The recent report issued by the Carnegie Commission on Higher Education has described the health manpower distribution problem as follows:

> The geographic distribution of health manpower is highly uneven, and although there is no clear agreement on what ratio of, say, physicians to population is adequate, there is little question that the supply of health manpower is gravely deficient in some parts of the nation. Moreover, the fact that New York and Massachusetts have high ratios of physicians to population

TABLE 23: Projected Number of Total Dentists, Professionally Active Dentists, and Dental Practitioners in New York, 1970-85

	Total Dentists		Professionally Active Dentists		Practitioners	
	Number	D:P	Number	D:P	Number	D:P
1970	15,071	1,262	12,989	1,465	12,713	1,496
1975	15,602	1,302	13,446	1,511	13,123	1,548
1980	16,369	1,327	14,217	1,528	13,864	1,567
1985	17,322	1,335	15,222	1,519	14,854	1,557

Source: Division of Dental Health, U.S. Public Health Service.

> does not mean that a resident of a lower income neighborhood of New York City or Boston has adequate access to a physician...
>
> The uneven geographic distribution of health manpower is, of course, related to differences in per capita income among states and local areas and resulting differences in family expenditures on health care. But these variations are also related to differences in education, in the size of communities in which people live, and to racial background. Merely increasing the supply of physicians will not solve the problem of deficient health care in low-income areas. As we move toward a more adequate system of financing medical care, we may also need to devise special financial and nonfinancial incentives to induce physicians and other health personnel to work in low-income areas (20, pp. 18-19).

The maldistribution of dental services in New York State is clearly documented in the present report. Unless active measures are taken to reverse trends in the relationship between dental supply and demand, it can be expected that New York's distribution problem will increase in the future. Several OPC regions with unfavorable current supply conditions have high proportions of older dentists and may suffer from replacement problems as these dentists retire. In addition, supply shortages in these areas may be compounded by the fact that older dentists tend to work fewer hours than younger men and are less likely to employ auxiliaries or to expand their practices to meet increasing care demands.

The provision of adequate dental care to residents of all areas of New York State should be a high priority goal. If it is to be achieved, imaginative and perhaps radical courses of action must be considered. One possible approach would involve offering some form of inducement to graduating dental students or to practitioners, in order to encourage them to practice in areas that are undersupplied

with dentists. These incentives could take several forms: loans to set up practice, tax benefits, time credits toward military obligations, providing facilities and ancillary services, and so forth.

Another approach would be to actively recruit dental students from areas with shortages of dentists. This may be the most appropriate approach to the maldistribution problem in New York State, since the study of factors related to practice location found that approximately 80 percent of New York dental school graduates who were originally from one of the less highly urbanized regions of the State either returned to their home area to practice or established practice in some other area outside of Metropolitan New York. An active recruitment program among residents of these outlying areas might involve preferential entrance requirements, loans for tuitions and living expenses which would be canceled after several years of practice in a region, and assistance in placing prospective dental students in New York or out-of-state schools.

As has been discussed in this report, New York has become increasingly reliant on schools in nearby states to provide dental training for its residents. Since over half of all New Yorkers enrolled in dental school now attend out-of-state schools, the States' dental manpower situation could be seriously jeopardized if out-of-state schools were to adopt admissions policies that would effectively exclude large numbers of New Yorkers.

New York's overdependence on out-of-state schools appears to have resulted largely from the slow expansion of dental training facilities within the State, thus forcing qualified applicants to attend out-of-

state schools. Another possible contributing factor may be that significant numbers of New Yorkers elect to attend out-of-state schools because of lower tuition and living expenses. The private institutions in New York State have had to increase their tuition charges to meet rising costs which places an increasing burden on prospective students and on enrolled students.

The shortage of freshman positions at New York dental schools will be remedied in part by the addition of Stony Brook and by planned increases in the number of freshman openings at each of the other New York schools (see table 24). Serious consideration should be given to ways of stimulating enrollment at and productivity of existing dental schools in the State such as by providing funds for more rapid expansion of existing training facilities and by implementing a program of financial assistance to the nonpublic dental schools to the degree granted to nonpublic medical schools in the State. Finally, financial assistance or other incentives might be offered to qualified resident applicants to New York dental schools to enable or encourage them to attend dental school in New York State.

Since many factors will affect the situation, the impact of the planned expansion of dental school facilities in New York State on the State's dental manpower supply cannot be accurately predicted. Furthermore, no information is available on what factors contribute to the decision to attend an out-of-state school or on what happens to resident applicants who are rejected by New York schools.

It is strongly recommended that a systematic study be conducted of patterns of dental school applicancy and admissions among New York

TABLE 24: Projected Number of New York Dental School Freshmen and Graduates, 1970-79

	Buffalo		Columbia		NYU		Stony Brook		Total	
	Freshmen	Grads	Freshmen	Grads	Freshmen	Grads	Freshmen	Grads	Freshmen	Grads
1970-71	80	71	47	36	179	172	-	-	306	279
1971-72	80	79	47	40	179	175	-	-	306	294
1972-73	80	84	47	43	179	173	16	-	322	300
1973-74	90	88	66	45	179	175	16	-	351	308
1974-75	90	90	66	45	210	175	16	-	382	310
1975-76	90	90	66	45	210	175	48	16	414	326
1976-77	90	100	66	60	210	175	48	16	414	351
1977-78	90	100	66	60	210	198	48	16	414	374
1978-79	100	100	66	60	210	198	48	48	424	406
1979-80	100	100	66	60	210	198	43	48	424	406

Source: Personal communications from Buffalo, Columbia, New York University, and Stony Brook.

residents, in order to (1) evaluate the effects of opening Stony Brook and expanding other training facilities; and (2) determine what happens to unsuccessful resident applicants to New York dental schools and to successful applicants who do not enroll at New York schools.

Some of the questions which should be examined in such a study are the following:

1. What changes occur in patterns of applicancy and admission among New York residents, with the opening of Stony Brook and the expansion of other training facilities? Does the total number of New York residents applying to dental schools increase, and by how much? Does the number of New Yorkers entering dental schools increase, and by how much? Does the proportion of New Yorkers applying to out-of-state schools decrease, and by how much?

2. What happens to New Yorkers who are rejected by New York dental schools? Do they gain admission to out-of-state dental schools, or do they make alternative career plans?

3. What happens to New Yorkers who are accepted by New York dental schools, but who do not enroll? Do they enroll at out-of-state dental schools, and if so, why do they elect to attend out-of-state dental schools?

In approaching these questions, particular attention should be given to residents of those areas of New York State in which dental manpower is in short supply. All dental school applicants from these areas should be studied in order to determine the number who fail to gain admission to dental school, but who are considered to be qualified for admission if a sufficient number of freshman positions are available.

This information could be of considerable value in planning appropriate programs and approaches to meet New York's demand for dental manpower.

Finally, it must be recognized that any programs designed to alleviate the maldistribution of dentists or to increase the capacity of dental training facilities within New York State will require several years to be implemented and to become effective factors in the State's supply of dental services. Some of the evidence discussed in the present report suggests that the efficiency and productive capacity of New York's dental care system could be considerably increased on a near-term basis through more widespread and effective auxiliary utilization. It is recommended that an investigation be undertaken to evaluate the possibility of improving New York's dental manpower situation through training and promoting the employment of more paraprofessionals.

APPENDIX A

STUDY OF DENTAL MANPOWER IN NEW YORK STATE

The basic purpose of this study is twofold: (1) to determine to what extent existing dental manpower and available dental services are meeting present demand for dental care of New York's population; and (2) to ascertain whether existing schools of dentistry, under present plans for expansion, will graduate enough additional dentists to meet the demand for dental care of the population through 1980. The study would be conducted over a 1-year period, with a final report available on March 31, 1971. Specifically, the study will be geared to answer the following questions.

Current Supply of Dentists

- How many dentists are currently practicing in the State, in each region?
- What active dentist/population ratios have existed from 1960 to the present in the State, in each region, compared to selected other states and the United States as a whole?
- What proportion of the active dentists are specialists?
- Into what age groupings do present New York active dentists fall?

Source of Dental Supply

- What has been the production of first-professional degrees of New York schools of dentistry, 1960 to the present?
- What has been the enrollment of New York residents in out-of-state schools of dentistry, 1960 to the present?
- What has been the annual migration into the State of out-of-state dentists, 1960 to the present?
- What percent of graduates of New York schools of dentistry remain in and practice in the State?
- What evidence exists which indicates that graduates of schools of dentistry tend to settle and practice near where

they were trained?

- What factors are operating which could alter the in-migration of new dentists--on which New York has traditionally depended?

- To what extent do accepted applicants at New York schools of dentistry choose to attend out-of-state schools?

Current Availability of Dental Services

- Is New York at the present time providing dental care on a comparable level with other states of similar characteristics?

- To what extent are available dental services comparable on an intrastate, interregional basis?

- What is the average number of visits per year per dentist in private practice in the State?

- What is the average number of days of waiting time for dental appointments in the State, in each region?

- What are the attitudes of the public concerning adequacy of present dental care in relation to need?

- What percentage of New York's population receiving dental care is covered (for dental care) by private/public health insurance programs?

- What percentage of New York's population is presently receiving dental care? (best estimate)

Projections

- What are projections of population growth through 1980 for the State, for each region?

- What number of new dentists per year through 1980 will be necessary to reach/maintain a desirable State, regional ratio? (allow for population growth, replacement of retired and deceased dentists)

- What are projections of growth of prepaid insurance dental programs and other forms of coverage through third-party payments? What impact will these have on demand for dental services through 1980?

- What are the plans of existing New York schools of dentistry

for expansion of enrollment through 1980?

- To what extent can existing and projected discrepancies between need and supply be met by existing New York schools of dentistry, within feasible limits of expansion, by 1980?

Other Factors Affecting Availability of Dental Services

- What relationship exists between supply of dental auxiliaries and availability of dental care?

- To what extent are active dentists utilizing auxiliary personnel in the State, in each region?

- What is the current extent of fluoridation in the New York water supply? To what extent is fluoridation expected to increase?

- What are the potential effects from new drugs, new dental techniques, and other products of dental research?

Methods

The study plan will include the following methods:

1. A review of existing literature on dental manpower, demand for dental services, and related topics.

2. A search for, compilation of, and reevaluation of existing data on dental manpower, demand for dental services, and related topics for the State of New York. Major sources of information will include: the 1966 and 1968 Surveys of Dentists Licensed in New York; the ADA Directory and relevant ADA published statistics; and the biannual registration statistics of the New York State Board of Dental Examiners. This information will be analyzed and compared to information available on other states for the period 1960 to 1980.

3. Separate analyses will be conducted for subregions of New York State. At the present time, the number of subregions has not been definitely determined. Under consideration will be the 12 Office of Planning Coordination regions and the seven Standard Metropolitan Statistical Areas (SMSAs) in New York. Suggestions will be sought from the State Education Department for the final determination of regions for statistical analysis.

4. Interviews will be conducted with administrators of schools of dentistry in New York State, with selected leaders of dentistry and other health professions, and with other key governmental and private officials. Systematic interview

schedules will be utilized in collecting this information. Suggestions from the State Education Department will be sought in the compilation of a list of persons to be interviewed.

5. A mail survey of New York State dentists will be conducted. A sample of dentists will be drawn from each of the regions for which manpower data will be analyzed. It is contemplated that 1,000 brief questionnaires will be mailed. The questionnaire will be similar to that utilized by the consultant in a survey of Massachusetts dentists.

6. A telephone survey will be conducted to study societal reactions to dental services sought and currently available.[1] Approximately 300 persons will be contacted to obtain their reactions to dental services. Persons will be selected from specific regions in New York to compare attitudes of persons located in areas which have relatively favorable dentist-to-population ratios and where dentists are able to keep up with the demand (as exemplified by short waiting times for appointments and acceptance of new patients) to attitudes of persons from areas which are unfavorable in these respects. The results of this telephone survey will be compared with other surveys conducted in other parts or the country on public reactions to dental services.

---

[1] On the basis of consultations between the author and the Education Department, it was decided to omit the consumer's survey from the study. Mail surveys of leaders of the dental profession in New York State and of deans of dental schools in the United States were substituted.

APPENDIX B

COUNTIES IN OPC REGIONS

Nassau-Suffolk
- Nassau
- Suffolk

New York City
- Bronx
- Kings
- New York
- Queens
- Richmond

Mid-Hudson
- Dutchess
- Orange
- Putnam
- Rockland
- Sullivan
- Westchester
- Ulster

Upper Hudson
- Albany
- Columbia
- Greene
- Rensselaer
- Saratoga
- Schenectady
- Schoharie

Mohawk Valley
- Fulton
- Herkimer
- Montgomery
- Oneida

Lake Champlain-Lake George
- Clinton
- Essex
- Hamilton
- Warren
- Washington

St. Lawrence
- Franklin
- Jefferson
- Lewis
- St. Lawrence

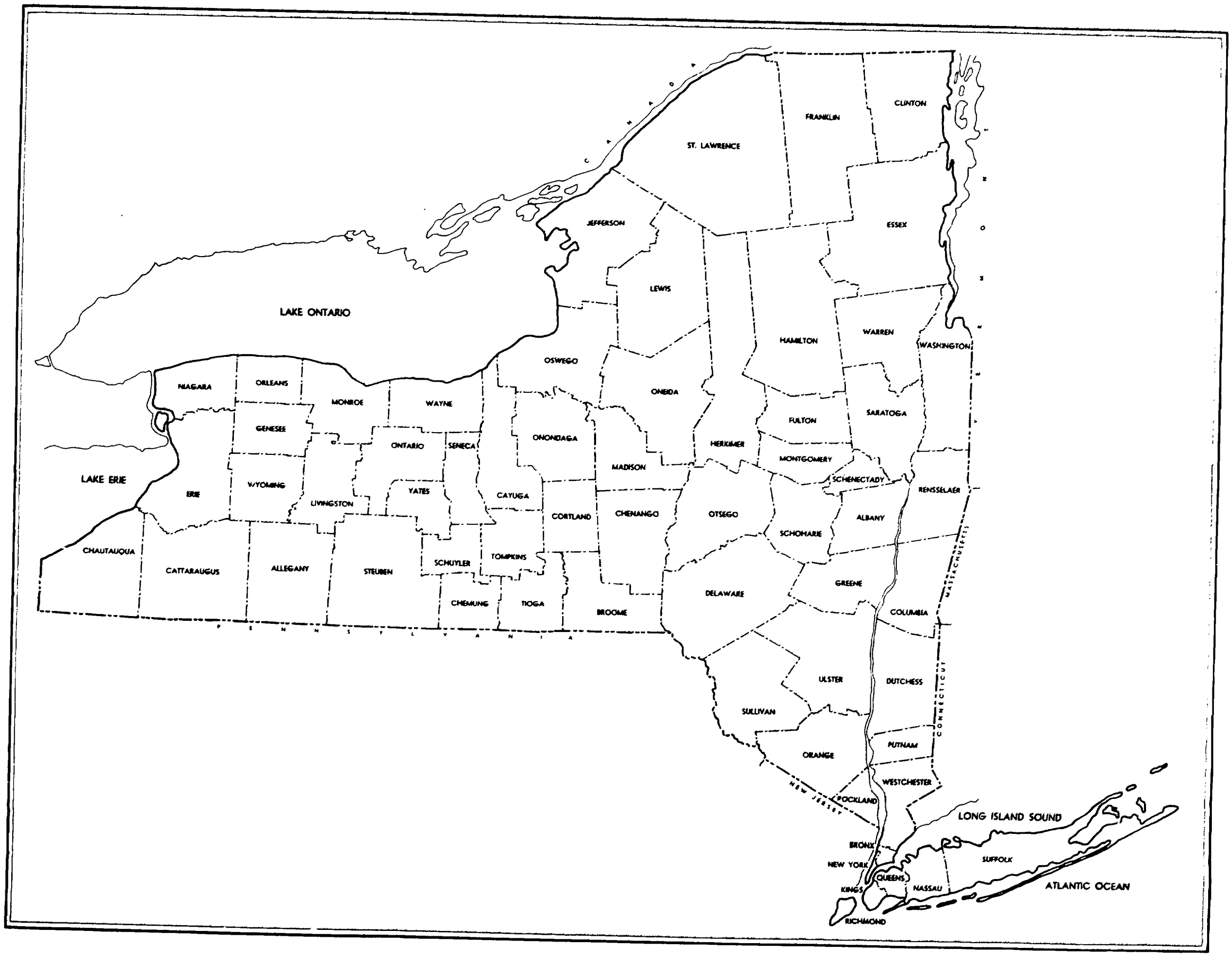
Central
- Cayuga
- Cortland
- Madison
- Onondaga
- Oswego

Southern Tier-East
- Broome
- Chenango
- Delaware
- Otsego
- Tioga
- Tompkins

Southern Tier-West
- Allegany
- Cattaraugus
- Chemung
- Chautauqua
- Schuyler
- Steuben

Lake Ontario
- Genesee
- Livingston
- Monroe
- Ontario
- Orleans
- Seneca
- Wayne
- Yates

Western
- Erie
- Niagara
- Wyoming


LAKE ONTARIO
LAKE ERIE
PENNSYLVANIA
NEW JERSEY
CONNECTICUT
MASSACHUSETTS
ATLANTIC OCEAN
LONG ISLAND SOUND
ST. LAWRENCE
FRANKLIN
CLINTON
JEFFERSON
LEWIS
ESSEX
HAMILTON
WARREN
WASHINGTON
OSWEGO
ONEIDA
FULTON
SARATOGA
NIAGARA
ORLEANS
MONROE
WAYNE
GENESEE
ONTARIO
SENECA
ONONDAGA
MADISON
HERKIMER
MONTGOMERY
SCHENECTADY
RENSSELAER
ERIE
WYOMING
LIVINGSTON
YATES
CAYUGA
CORTLAND
CHENANGO
OTSEGO
SCHOHARIE
ALBANY
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
STEUBEN
SCHUYLER
TOMPKINS
CHEMUNG
TIOGA
BROOME
DELAWARE
GREENE
COLUMBIA
ULSTER
DUTCHESS
SULLIVAN
ORANGE
PUTNAM
WESTCHESTER
ROCKLAND
BRONX
NEW YORK
KINGS
QUEENS
NASSAU
SUFFOLK
RICHMOND

APPENDIX C

Study Method of the Mail Survey of New York Dentists

Sample: Material provided by Dr. Donald F. Wallace of the New York Board of Dental Examiners was used to identify all dentists who were licensed and residing in the 12 New York OPC regions as of August 1970. Separate samples were drawn within each OPC region, resulting in a total of 1,040 dentists. Questionnaires were mailed to all 1,040. Among these, 924 were in private practice in New York State at the time of the survey, and eligible for inclusion; 116 were found not to be eligible because they were no longer in practice or because they had moved out-of-state or were not in private practice. The number of dentists in each region and the number drawn for the sample were as follows:

OPC Region	Total Dentists	Sample
Nassau-Suffolk	2,070	100
New York City	6,993	100
Mid-Hudson	1,420	100
Upper Hudson	455	100
Mohawk Valley	234	100
Lake Champlain-Lake George	99	50
St. Lawrence	93	50
Central	373	100
Southern Tier-East	236	80
Southern Tier-West	223	80
Lake Ontario	642	100
Western	852	100
TOTAL N.Y.	13,690	1,040

Procedure: Questionnaires were mailed with a covering letter from the New York State Department of Education. Approximately 3 weeks after the mailing, a followup letter was sent to nonrespondents. Those who failed to respond to the followup letter received a second questionnaire and letter at a later date.

Data analysis: Data analyses were limited to general practitioners because the number of specialists was not sufficient to permit detailed analysis (88 percent were general practitioners, and 12 percent were specialists).

In computing totals for New York State general practitioners, frequencies were weighted according to the proportion of the total number of dentists (13,960) in each OPC region. Thus, weights were based on the distribution of all dentists (including specialists) rather than on general practitioners. This procedure should accurately reflect the distribution of general practitioners, however, since the 1966 Survey of Dentists Licensed in New York reported that there was little variation among regions in the proportion who limit their practice to a specialty. Similarly, approximately the same proportions were found among respondents in the present survey.

The University of the State of New York
The State Education Department
Office of Planning in Higher Education
Albany, New York 12224

SURVEY OF DENTAL PRACTICE

Note: If you do not have a private practice in which you see patients, do not fill out the rest of the questionnaire. Check here and return in the enclosed envelope, writing your name on the back of it.

( ) Not practicing.

1. Town in which your (main) dental practice is located _____

   Town in which second practice (if any) is located _____

2. What is your age? _____(years).

3. Which type of practice do you have:

   ( ) General
   ( ) Specialty (indicate) _____
   ( ) General and Specialty _____

4. Check the item which best describes your practice.

   ( ) Independent practice--without partners--no shared costs of office, assistants, etc.
   ( ) Independent practice--without partners--but with shared costs.
   ( ) Independent practice--with partners in complete partnership (both income and costs shared)
   ( ) Employed by another dentist
   ( ) Other (specify) _____

5. Please indicate the number of each of the following types of auxiliaries employed in your office(s).

	Number Full-Time	Number Part-Time
Dental assistants		
Receptionist/Secretary		
Dental hygienists		
Dental technicians		
Other employees (specify)		

6. Approximately how many weeks of the year do you work at your practice? _____

Over, please

7. In an average week:
   a. How many hours do you spend seeing private patients? _____
   b. How many private patient visits do you have? _____

8. Do you presently accept new patients? ( ) Yes ( ) No

9. Barring emergencies, how long, on the average, did patients who called for an appointment have to wait for an appointment with you? (Check one)

( ) no wait at all
( ) less than a week
( ) about a week
( ) up to two weeks
( ) up to three weeks
( ) four weeks
( ) more than four weeks

10. For each method of payment for dental services, please estimate what percentage of your patients pay that way?

	Percent
Personal payment	_____
Prepayment plan	_____
Medicaid	_____
TOTAL	100%

11. Would you prefer: (Check one)
_____ to have more patients than you presently have?
_____ to have fewer patients than you presently have?
_____ about the same number as you presently have?

12. Which statement best describes the area where you practice? (Check one)

_____ There are not enough dentists to handle adequately the current demand for dental care.
_____ There are sufficient dentists to handle current demand.
_____ There are more than enough dentists to handle current demand.

Please print your name on the back of the return envelope for check-off purposes. This will assure that you are not sent another questionnaire.

The University of the State of New York
The State Education Department
Office of Planning in Higher Education
Albany, New York 12224

SURVEY OF LEADERS OF DENTAL PROFESSION

1. In which district dental society are you located?_____

2. Which of the following statements best describes the supply of dentists in general practice in the region covered by your district dental society? (Check one)

   _____ There are <u>not enough</u> dentists to handle adequately the current demand for dental care.

   _____ There are <u>sufficient</u> dentists to handle adequately the current demand for dental care.

   _____ There are <u>more than enough</u> dentists to handle adequately the current demand for dental care.

   <u>Comment</u> (optional): _____

3. For each specialty, check the statement which best describes the supply of specialists in the region covered by your district dental society.

	<u>Not enough to handle demand</u>	<u>Sufficient number to handle demand</u>	<u>More than enough to handle demand</u>
A. Endodontists	( )	( )	( )
B. Oral Pathologists	( )	( )	( )
C. Oral Surgeons	( )	( )	( )
D. Orthodontists	( )	( )	( )
E. Pedodontists	( )	( )	( )
F. Periodontists	( )	( )	( )
G. Prosthodontists	( )	( )	( )

<u>Next page, please</u>

SURVEY OF LEADERS OF DENTAL PROFESSION, CONT.

4. What is your estimate of the percentage of people in the region covered by your district dental society who do not receive as much dental care as they need? _____%

What kinds of steps can be taken in order to reduce this percentage?

_____

_____

_____

_____

5. What is your estimate of the percentage of people in your district dental society who are now covered by prepaid dental insurance programs? _____%

What is your estimate of the percentage of people who will be covered by prepaid dental insurance programs in 1980? _____%

6. About what percentage of public water supplies in your district dental society are now fluoridated? _____%

What is your estimate of the percentage of public water supplies which will be fluoridated by 1980? _____%

7. Indicate below any other developments that you foresee over the next ten years which will produce changes in dental needs of the population or in the demand for dental care.

_____

_____

_____

_____

_____

_____

Please use the remaining space as well as the back of this sheet for any other comments on the dental care needs of your district now and in the coming ten years. Thank you for your cooperation.

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
Office of Planning in Higher Education
Albany, New York 12224

QUESTIONNAIRE FOR SURVEY OF DEANS OF UNITED STATES DENTAL SCHOOLS

1. Between 1970 and 1980 a number of factors might affect dental needs, dental demand, or the delivery of dental services. To what extent do you think each of the following will <u>increase</u>, on a national basis, between 1970 and 1980? Please check the category which applies to each item.

	none	slight	moderate	considerable	large
a. Fluoridation of water supplies	( )	( )	( )	( )	( )
b. Dentists using auxiliary personnel at chairside	( )	( )	( )	( )	( )
c. Dentists in group practice	( )	( )	( )	( )	( )
d. Number of people participating in prepaid dental insurance plans	( )	( )	( )	( )	( )
e. Percentage of college students entering the field of dentistry.	( )	( )	( )	( )	( )

2. What do you think are the chances for each of the following events to occur between 1970 and 1980? Please check the category which applies to each item.

	unlikely	slight	moderate	good	excellent
a. Dental research breakthroughs on prevention of caries	( )	( )	( )	( )	( )
b. More sophisticated dental equipment allowing speedier performance of tasks	( )	( )	( )	( )	( )
c. Expansion of functions of dental auxiliaries	( )	( )	( )	( )	( )

3. Compared with 1970, how <u>adequately</u> will the dental profession be able to handle the dental demand in 1980? (Check one only)

_____ much more adequately

_____ somewhat more adequately

_____ no change

_____ somewhat less adequately

_____ much less adequately

4. What other factors do you think will occur between 1970 and 1980 to change dental needs, dental demand, or delivery of dental services? _____

INTERVIEW FOR DEANS OF NEW YORK STATE DENTAL SCHOOLS

1. What is the admissions practice at your school in regard to accepting out-of-state versus in-state applicants?

2. During the past five years has it been necessary for you to turn down applicants who, in your judgment, would make competent dentists?

   _____ Yes

   _____ No

   If YES, about what percentage of rejected applicants would make competent dentists? _____%

   (It is recognized that these applicants may gain admission elsewhere)

3. Do you see any trend developing for certain out-of-state schools to take fewer New York applicants than they have formerly?

   _____ Yes

   _____ No

   a. If YES, what schools and why? _____

   b. If NO, do you think that there is a likely possibility that a trend will develop in the next ten years for out-of-state schools to take fewer New York applicants than they do now?

      _____ Yes

      _____ No

      If Yes, why?_____

4. About what percentage of applicants accepted by your school choose to attend?

   another New York dental school _____%

   an out-of-state dental school _____%

TABLE 25: Total Dentists, Dental Practitioners, and Specialists by State, 1960 and 1968

	Total Dentists[1]		Practitioners[2]		Specialists[3]
	1960	1968	1960	1968	1960
New York	14,179	14,817	12,289	12,614	1,087
California	9,840	12,611	8,793	10,996	1,511
Connecticut	1,778	1,975	1,592	1,742	197
Illinois	6,413	6,394	5,382	5,371	449
Indiana	2,204	2,300	1,857	1,995	206
Massachusetts	3,615	3,937	3,035	3,359	372
Michigan	4,122	4,597	3,650	4,074	462
New Jersey	3,927	4,476	3,526	3,962	396
Ohio	4,820	5,185	4,121	4,461	390
Pensylvania	7,063	6,780	5,935	5,737	423
Texas	3,418	4,368	3,095	4,013	368
Wisconsin	2,565	2,579	2,150	2,158	118
TOTAL U.S.	98,491	109,205	85,347	94,967	9,071

Sources: [1] Distribution of Dentists in the United States by State, Region, District, and County, Bureau of Economic Research and Statistics, American Dental Association, 1961 and 1969.

[2] Division of Dental Health, U.S. Public Health Service.

[3] Facts About States. Bureau of Economic Research and Statistics, American Dental Association, 1969.

TABLE 26: Total Dentists by OPC Region, 1960, 1965, and 1968

	1960	1965	1968
Nassau-Suffolk	1,570	1,919	2,110
New York City	8,134	7,896	7,784
Mid-Hudson	1,273	1,422	1,515
Upper Hudson	432	454	461
Mohawk Valley	228	222	215
Lake Champlain-Lake George	105	105	113
St. Lawrence	102	99	108
Central	365	394	389
Southern Tier-East	245	248	254
Southern Tier-West	232	229	227
Lake Ontario	603	659	696
Western	890	919	945
TOTAL N.Y.	14,179	14,566	14,817

Source: Distribution of Dentists by State, Region, District, and County, Bureau of Economic Research and Statistics, American Dental Association, 1961, 1966, and 1969.

TABLE 27: 1966 Professionally Active Dentists and 1970 Licensed Resident Dentists by OPC Region

	1966 Professionally Active Dentists[1]	1970 Licensed Resident Dentists[2]
Nassau-Suffolk	1,648	2,070
New York City	6,716	6,993
Mid-Hudson	1,214	1,420
Upper Hudson	394	455
Mohawk Valley	193	234
Lake Champlain-Lake George	88	99
St. Lawrence	96	93
Central	339	373
Southern Tier-East	204	236
Southern Tier-West	209	223
Lake Ontario	565	642
Western	761	852
TOTAL N.Y.	12,427	13,690

Sources: 1
1966 Survey of Dentists Licensed in New York, New York State Board of Dental Examiners and the American Association of Dental Examiners, 1968.

2
Compiled from material provided by Dr. Donald F. Wallace, New York Board of Dental Examiners.

TABLE 28: 1970-85 Population Projections by State

	1970	1975	1980	1985	1970-80	1970-85
New York	19,024,700	20,319,400	21,722,000	23,124,600	14.2%	21.6%
California	21,542,200	24,751,800	28,452,300	32,530,400	32.1	51.0
Connecticut	3,107,200	3,417,600	3,767,900	4,135,300	21.3	33.1
Illinois	11,165,400	11,903,300	12,844,400	13,946,000	15.0	24.9
Indiana	5,154,800	5,481,600	5,897,600	6,382,900	14.4	23.8
Massachusetts	5,600,700	5,898,600	6,299,400	6,765,200	12.5	20.8
Michigan	8,702,000	9,250,600	9,923,800	10,655,200	14.0	22.4
New Jersey	7,397,000	8,141,400	8,973,800	9,860,400	21.3	33.3
Ohio	11,001,000	11,768,700	12,746,800	13,893,200	15.9	26.3
Pennsylvania	11,881,900	12,268,200	12,818,400	13,497,400	7.9	13.6
Texas	11,524,200	12,557,300	13,686,300	14,815,300	18.8	28.6
Wisconsin	4,404,200	4,671,300	5,027,900	5,460,700	14.2	24.0
TOTAL U.S.	207,828,800	224,459,100	244,147,900	265,700,300	17.5	27.8

Source: Division of Dental Health, U.S. Public Health Service.

TABLE 29: Applications to Selected Out-of-State Dental Schools and Enrollment in 1962, 1963, and 1965-69[1, 2]

	Applicants			Freshmen		
	Total	% From N.Y.	% Residents	Total	% From N.Y.	% Residents
Farleigh-Dickinson						
1962	693	49.9%	28.9%	50	20.0%	60.0%
1963	838	50.1	26.1	50	20.0	60.0
1965	963	46.1	24.0	50	22.0	58.0
1966	1,029	46.2	23.4	50	30.0	52.0
1967	988	47.3	21.8	56	21.4	57.1
1968	1,396	49.3	21.3	55	29.1	50.9
1969	1,677	42.8	24.3	55	25.4	56.4
Georgetown						
1962	395	33.9%	3.5%	105	22.8%	11.4%
1963	511	27.2	2.7	104	21.2	11.5
1965	686	32.9	1.6	100	22.0	3.0
1966	849	32.4	2.7	109	24.8	2.8
1967	720	32.9	1.9	111	27.0	3.6
1968	1,338	31.0	1.5	112	37.5	0.0
1969	1,588	30.2	0.8	111	31.5	0.0
Howard						
1962	185	10.8%	12.4%	80	8.8%	5.0%
1963	182	15.4	14.3	83	9.6	9.6
1965	315	30.2	9.2	83	19.3	7.2
1966	412	33.2	10.7	87	17.2	1.1
1967	418	33.0	5.0	86	34.9	7.0
1968	624	35.7	3.4	88	36.4	4.5
1969	867	34.6	2.2	95	26.3	12.6
New Jersey College of Dentistry						
1962	330	42.7%	25.4%	42	19.0%	57.1%
1963	944	41.6	28.9	44	38.6	47.7
1965	641	48.8	21.8	44	40.9	47.7
1966	653	48.2	25.4	55	34.5	58.2
1967	664	49.5	27.9	55	20.0	69.1
1968	1,037	47.4	24.4	61	*	*
1969	1,212	41.2	31.5	56	25.0	69.6

(Continued)

TABLE 29: (continued)

	Applicants			Freshmen		
	Total	% From N.Y.	% Residents	Total	% From N.Y.	% Residents
Pennsylvania						
1962	471	43.9%	15.3%	138	42.0%	18.8%
1963	543	39.4	16.2	138	31.1	25.4
1965	744	41.4	14.0	140	37.1	18.6
1966	660	44.1	15.4	146	38.4	15.8
1967	512	38.1	16.8	150	41.3	18.0
1968	1,202	34.5	20.9	149	38.9	19.3
1969	1,341	33.3	17.8	148	39.2	18.9
Pittsburgh						
1962	410	26.8%	37.3%	93	8.6%	79.6%
1963	409	29.1	37.4	96	14.6	69.8
1965	602	41.5	24.9	104	21.2	65.4
1966	750	42.1	25.9	104	8.6	80.8
1967	614	43.8	25.9	116	13.8	76.7
1968	1,401	34.7	30.7	116	7.8	87.9
1969	1,548	29.4	31.7	120	4.2	87.5
Temple						
1962	654	36.5%	25.5%	130	22.3%	46.9%
1963	790	37.6	23.3	129	13.2	53.5
1965	1,069	39.6	18.1	126	20.6	43.6
1966	1,119	38.4	17.9	133	21.8	45.1
1967	1,458	40.9	16.7	135	20.7	46.7
1968	1,762	37.7	23.4	136	25.7	61.8
1969	1,942	33.0	23.4	135	9.6	66.7
Tufts						
1962	404	38.4%	30.2%	102	12.7%	57.8%
1963	475	34.7	29.3	103	17.5	52.4
1965	692	36.7	25.4	103	24.3	43.7
1966	682	41.3	28.2	108	29.6	38.0
1967	712	42.8	21.5	108	38.9	34.2
1968	1,123	42.9	17.6	108	43.5	32.4
1969	1,324	39.4	17.7	108	39.8	30.6

[1] Information was not available for 1964.

[2] Beginning in 1968, a new definition of "applicant" was used.

*Information was not available in 1968.

Source: Applicants to Dental Schools, Council on Dental Education, American Dental Association.

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Note: Other sources are indicated on tables.