

Assessing the Balance of Physician Manpower in a Metropolitan Area

**ALMA W. McMILLAN, B.S., MARIAN E. GORNICK, B.S., RONALD R. ROGERS,
and MARTIN K. GORTEN, M.D.**

THE PATTERNS established by persons seeking medical care are determined largely by their socioeconomic level, whether they have private health insurance, are eligible for Medicare or Medicaid, and the availability of medical services. Andersen and Anderson (1) correlate the socioeconomic status of persons with the type of physicians' care purchased, that is, whether that of a specialist, general practitioner, or clinic. Among income groups, the lowest makes the greatest use of clinics and the upper, the greatest use of specialists. Moreover, families in the upper income group report more recent physician examinations and respond more actively to symptoms of illness by seeking a physician's care.

The authors are with the medical care services section, Baltimore (Md.) City Health Department. Mrs. McMillan is a statistician, Mrs. Gornick a public health analyst, and Mr. Rogers a systems analyst; Dr. Gorten is director of the section.

Other members of the Baltimore City Health Department who contributed to the study were Dr. John B. DeHoff, Dr. Henry W. D. Holljes, and Dr. Matthew Tayback (who is now with Maryland State Department of Health), who helped plan and design the study; John B. Russell, who helped design and execute a system for processing the data; Mrs. Edith O. Mullahey, who edited the incoming questionnaires and set up procedures for maintaining the files; and Mrs. Agnes Mitchell, who coded the questionnaires.

In the decade 1960-70, changing economic factors have emerged to increase the demand for medical care services—greater national prosperity, broader participation in private health insurance plans, and inception of the Medicare-Medicaid programs. Data from the National Health Survey (2) illustrate some of the effects of programs for the aged and needy. For the period July 1966-June 1967, persons with family incomes under \$3,000 per year averaged more physician visits than persons with annual incomes in the range \$3,000-\$10,000. The high rate of physician visits among persons with family incomes of less than \$3,000 reflects both the need for medical care among the elderly, who comprise a high proportion of this income group, and the availability of publicly funded care for the needy, care which is not available to persons with incomes above the poverty level.

These factors, combined with an expanding population, have placed considerable strain upon medical care resources, especially manpower. Current experience has shown that funding does not necessarily make services available. What it has demonstrated recently is that organizing and delivering health care services may be more difficult than financing the cost of such services.

An important aspect of the delivery of health services is the manner in which medical care facilities are spatially distributed vis-a-vis the distribution of the population. Hence, much of

planning consists of attempts to optimize these relations (3).

Our study presents an analysis, at the census tract level, of physician manpower in relation to the population, with special emphasis on the analysis of sources of primary care services. We hope that the methods used in our study and its results will be of interest to community-oriented health professionals and planners in metropolitan areas across the nation.

In the summer of 1967, the Baltimore City Health Department initiated a study of physician manpower. Data were needed from physicians in order to determine (a) whether the physician was in training or beyond the training stage, (b) his type of practice (general or specialty) and—for the physician beyond training—whether he was eligible for an American specialty board or certified by one, (c) whether the physician was engaged in caring for patients or in teaching, research, administration, public health, and other professional activities, and (d) whether, if he was engaged in caring for patients, he had a private or hospital-based office.

Our objectives included plans for keeping the results current.

Study Area and Population Characteristics

The geographic boundaries set for the study area included Baltimore City and the five adjacent counties of Baltimore, Anne Arundel, Harford, Howard, and Carroll. These subdivisions form the Baltimore Standard Metropolitan Statistical Area (SMSA). Baltimore County nearly surrounds the city, except in the southern area, where Anne Arundel County is adjacent to the city. Harford, Howard, and Carroll Counties are contiguous to Baltimore County.

In preparation for our analysis of physician manpower, we divided the Baltimore SMSA into 24 study districts, using census tract boundaries. The residents of each area had similar demographic characteristics. Baltimore City was apportioned into 15 districts, with an average of 11 census tracts per district; Baltimore County, into four districts; and Anne Arundel, into two districts. Harford, Howard, and Carroll Counties, with relatively small populations, were each considered as a district.

In 1966, the total population of the SMSA was estimated at 1,961,960 persons (4). This figure reflected approximately an 8 percent growth over the 1960 census counts. The 1966 SMSA population was distributed as follows: Baltimore City—46 percent, Baltimore County—29 percent, Anne Arundel County—14 percent, Harford County—5 percent, Carroll County—3 percent, and Howard County—3 percent.

Although the Baltimore SMSA experienced an 8 percent increase in population during the period 1960–66, Baltimore City had a 3 percent decrease. Much of the decrease was due to an exodus of white middle-income families to the nearby suburbs. During the 6 years, there was also a general shift of persons within the city from the inner areas to the outer boundaries. The northeastern area of the city experienced the greatest increase in population while the south-central area showed the largest decrease. During the same period all counties in the SMSA had a large growth in population. The age composition of the Baltimore SMSA in 1966 was similar to that of the nation: about 8 percent (156,000) of the population was 65 years and over and 37 percent (722,000) was 17 years or under. The ratio of whites to nonwhites in the SMSA was 78 to 22, compared with 88 to 12 for the nation. In Baltimore City, the ratio was 59 whites to 41 nonwhites.

Methods of Study

To compile a complete list of licensed medical doctors in the area (doctors of osteopathy were not included in our study), we researched and cross-referenced every known directory containing information on physicians of the Baltimore metropolitan area. Each physician whose name appeared on the list was initially included in the study. The directories included the licensure book of the Maryland State Board of Medical Examiners (triennial), the membership book and monthly reports of the Maryland State Medical and Chirurgical Faculty, monthly reports from the circuit court of Baltimore City, the directories of faculty, medical staff, and administrative personnel of Johns Hopkins Hospital and University Hospital, the student-faculty centrex telephone directory of the University of Maryland in Baltimore, the

State's list of vendors for the Medical Assistance Program (Medicaid), and telephone directories.

Physicians and others knowledgeable in survey techniques prepared a questionnaire designed to gather information to fulfill the objectives of the study. It was to be self-administered and the questions were arranged so that they could be answered with minimal effort and time by the respondent physician. To facilitate coding and tabulating, data processing personnel were consulted in the design of the form (samples of which are available upon request to the senior author). Information about physicians who were beyond training was to be processed in detail. Coding sheets were designed for storing the data from the questionnaire; three Hollerith cards were allotted for each physician.

In September 1967, questionnaires were mailed to approximately 3,400 physicians. A checklist was kept on those that were returned and, in December 1967, followup was begun with telephone calls to the physicians who had not yet responded. A new form was sent if the original questionnaire had been lost or misplaced. Additional followup telephone calls were also made, although a precise record of the number was not kept.

To obtain complete counts of interns, residents, and fellows, we made direct inquiries to all hospitals in the Baltimore SMSA.

Each physician responding to the questionnaire was "mapped" into the appropriate census tract and district according to his professional address. His responses were edited, coded, and keypunched. Stored data included name, year of birth, year physician received his M.D. degree, year of licensure, years in practice, field of practice (generalist or kind of specialty), his eligibility for—or certification by—an American specialty board, the percentage of his effort expended in patient care, research, teaching, administration, and so forth, professional address or addresses, hospital affiliations and privileges, and membership in national professional organizations. In addition, and of particular value to the medical care services section, the physician's vendor number was included if he participated in Medicaid.

Procedures were instituted to keep the files

current. Changes in professional address, as well as additions and deletions to the files, are made by checking new telephone directories and scanning reports of the medical societies, the Maryland Board of Examiners, the Circuit Court of Baltimore City, and the bureau of biostatistics of the Baltimore City Health Department, and obituaries in newspapers.

For our study, an active physician was defined as a physician in training or beyond the training stage who was practicing—that is, engaged in patient care—or who was nonpracticing—that is, engaged in administration, public health, research, teaching, and so forth. The first tabulations for the Baltimore SMSA were made in May 1968. Of the physicians originally surveyed who were in training and beyond the training stage, the number lost to survey and the number remaining were as follows:

<i>Physicians originally surveyed</i>	<i>Number</i>
Lost to survey.....	659
No response to questionnaire.....	175
Moved, retired, deceased, or former house of ficers who left area.....	425
In Armed Forces.....	59
Remaining in survey.....	4,297

Results

Of the 4,297 known active physicians in the Baltimore SMSA in May 1968, a total of 2,571 were beyond the training stage and 1,726 were in hospital training. Physicians in training comprised 40 percent of all the active physicians in the Baltimore SMSA. Physicians beyond the training stage comprised 60 percent. The ratio of practicing physicians to nonpracticing physicians and physicians in government service was more than 4 to 1. A practicing physician was defined as one beyond the training stage who was expending some or all of his efforts in caring for patients. Table 1 shows the distribution of physicians in the SMSA according to whether they were in training or beyond. Nine of 10 who were in training and seven of 10 who were practicing had offices in Baltimore City.

Physicians giving primary care. Almost two-thirds (62 percent) of the practicing physicians in the SMSA were primary care physicians. This group includes general practitioners, general surgeons, specialists in internal medicine, pediatricians, and obstetrician-

gynecologists. Specialists in internal medicine comprised the largest proportion of the group, accounting for 18 percent of all practicing physicians in the SMSA. General practitioners and general surgeons each comprised 13 percent of the practicing physicians, obstetrician-gynecologists 11 percent, and pediatricians 7 percent (table 2). Baltimore City had 46 percent of the SMSA population and 67 percent of the primary care physicians.

Physicians in other specialties. The remaining 38 percent of practicing physicians reported 27 other specialties, distributed over 11 broad categories. Among these 11 categories, psychiatry (including child psychiatry) accounted for the greatest proportion of practicing physicians—10 percent (table 2). Baltimore City and Baltimore County combined had 92 percent of the specialists not in the primary care category.

Location of physicians' offices. Eighty-eight

Table 1. Distribution of active physicians, in training and beyond, Baltimore SMSA, May 1968

Area	Active physicians (100 percent)	In training (40 percent)			Beyond training (60 percent)		
		Interns, residents (31 percent)	Fellows (9 percent)	Total	Practicing (49 percent)	Nonpracticing (11 percent)	Total
Baltimore SMSA.....	4, 297	1, 320	406	1, 726	2, 085	¹ 486	2, 571
Baltimore City.....	3, 450	1, 178	381	1, 559	1, 457	¹ 434	1, 891
Baltimore County.....	584	135	25	160	390	34	424
Anne Arundel County.....	132	4	0	4	120	8	128
Harford County.....	57	3	0	3	53	1	54
Carroll County.....	55	0	0	0	49	6	55
Howard County.....	19	0	0	0	16	3	19

¹ Includes 50 physicians in government installations.

Table 2. Distribution of practicing physicians, by type of practice, Baltimore SMSA, May 1968

Type of practice	Baltimore SMSA		Number in Baltimore City	Number in counties				
	Percent	Number		Baltimore	Anne Arundel	Harford	Carroll	Howard
Total.....	100	2, 085	1, 457	390	120	53	49	16
Primary care.....	62	1, 320	880	267	81	14	35	13
General practice.....	13	281	143	74	21	18	18	7
General surgery.....	13	278	218	32	15	7	6	0
Internal medicine.....	18	380	275	66	19	10	6	4
Pediatrics.....	7	148	74	59	11	2	2	0
Obstetrics-gynecology.....	11	233	170	36	15	7	3	2
Other specialties ¹	38	765	577	123	39	9	14	3
Psychiatry.....	10	198	134	41	11	2	8	2
Internal medicine subspecialties.....	4	81	68	7	3	1	2	0
Radiology.....	3	68	59	3	4	2	0	0
Anesthesiology.....	4	82	38	36	4	2	2	0
Pathology.....	2	42	30	7	3	1	1	0
Ophthalmology.....	3	65	52	11	2	0	0	0
Otolaryngology.....	3	53	42	8	3	0	0	0
Orthopedic surgery.....	3	53	47	2	4	0	0	0
Neurosurgery.....	1	22	21	0	1	0	0	0
Urology.....	2	33	30	1	2	0	0	0
Other.....	3	68	56	7	2	1	1	1

¹ Psychiatry includes child psychiatry; the subspecialties of internal medicine are dermatology, allergy, cardiovascular disease, gastroenterology, neurology, and pulmonary diseases; radiology includes diagnostic and therapeutic; pathology includes forensic; "other"

includes colon and rectal surgery, plastic surgery, thoracic surgery, administrative medicine, aviation medicine, occupational medicine, general preventive medicine, physical medicine and rehabilitation, public health, and other nonrecognized specialties.

Table 3. Distribution of physicians, by type of practice, with percentage having private offices, Baltimore SMSA, May 1968

Type of practice	Number	Percentage with private offices
Total number.....	2,085	88
Primary care.....	1,320	93
General practice.....	281	98
General surgery.....	278	93
Internal medicine.....	380	88
Pediatrics.....	148	95
Obstetrics-gynecology.....	233	95
Other specialties ¹	765	80
Psychiatry.....	198	76
Internal medicine subspecialties.....	81	89
Radiology.....	68	54
Anesthesiology.....	83	84
Pathology.....	42	36
Ophthalmology.....	65	91
Otolaryngology.....	53	94
Orthopedic surgery.....	53	94
Neurosurgery.....	22	82
Urology.....	33	94
Other.....	67	84

¹ See footnote, table 2.

percent of the 2,085 practicing physicians in the Baltimore SMSA had private offices. In the primary care group, 98 percent of the general practitioners had private offices. Among the other specialty groups, the range was from 94 percent of the otolaryngologists, orthopedic surgeons, and urologists to 36 percent of the pathologists (table 3). Other specialty groups had high proportions of physicians with hospital-based offices; aside from the pathologists, 46 percent of the radiologists and 24 percent of the psychiatrists had hospital-based offices.

The distribution of physicians in Baltimore City by kind of office site was similar to that for the SMSA.

Physician's age and type of practice. The 2,085 practicing physicians in the SMSA were distributed by age and type of practice to three major categories—(a) general practice, (b) specialties in internal medicine, general surgery, pediatrics, and obstetrics-gynecology, and (c) all other specialties (table 4). Two hundred eighty-one (13 percent) of the 2,085 practicing physicians were general practitioners; the remaining 87 percent had a specialty prac-

tice. Six hundred eighty-nine (33 percent) of the 2,085 practicing physicians were in the age group 36–45 years; only 164 (8 percent) were 35 years or younger, and 238 (11 percent) were over 65.

Figure 1 illustrates how small the proportion of general practitioners is among the younger age groups. In the age group 25–35 years, only 9 percent of the physicians are general practitioners whereas, in the age group over 65 years, 25 percent are general practitioners. The other primary care physicians account for nearly the same proportion (50–52 percent) in all age groups except the one over 65 years, in which 42 percent are primary care specialists.

Table 4 also shows the proportions of physicians who were certified by an American specialty board or eligible for such certification. Of those in a specialty type practice, 42 percent were certified and 39 percent were either board eligible or had memberships in recognized national specialty organizations. Figure 2 il-

Figure 1. Percentage distribution of practicing physicians, by type of practice, Baltimore SMSA, May 1968

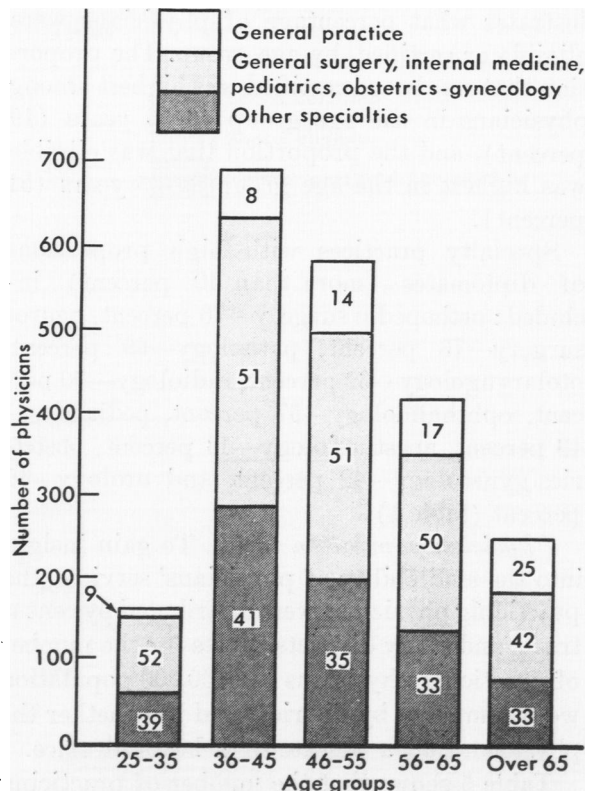


Table 4. Distribution of practicing physicians, by age group, with and board certified, Baltimore

Type of practice	All ages			25-35 years			36-45 years			46-55 years		
	Number	Percent		Number	Percent		Number	Percent		Number	Percent	
		C	E		C	E		C	E		C	E
Total.....	2,085	39	34	164	16	46	689	44	35	582	35	31
General.....	281	21	4	15	20	0	53	34	2	85	23	2
All other types.....	1,804	42	39	149	15	51	636	45	38	497	49	36
Primary care specialties.....	1,039	37	43	85	18	47	350	41	43	297	40	42
General surgery.....	278	36	47	15	27	13	87	33	49	90	42	49
Internal medicine.....	380	29	48	33	9	61	128	29	51	102	33	46
Pediatrics.....	148	49	28	21	29	48	50	76	12	39	51	29
Obstetrics-gynecology.....	233	42	40	16	13	50	85	45	41	66	45	36
Other specialties ¹	765	49	33	64	13	56	286	50	32	200	64	26
Psychiatry.....	198	40	44	18	0	67	77	34	46	57	60	30
Internal medicine subspecialties.....	81	36	43	3	0	100	25	44	36	19	58	26
Radiology.....	68	60	16	8	38	25	27	67	7	18	61	22
Anesthesiology.....	83	43	46	4	25	50	46	44	46	25	52	40
Pathology.....	42	69	12	6	0	50	20	70	5	9	89	11
Ophthalmology.....	65	57	28	12	25	42	15	73	27	14	79	14
Otolaryngology.....	53	62	23	2	50	50	12	67	25	15	80	13
Orthopedic surgery.....	53	76	19	2	0	50	24	67	25	14	92	7
Neurosurgery.....	22	73	14	3	0	67	11	73	9	6	100	0
Urology.....	33	42	33	4	0	75	14	50	21	7	43	29
Other.....	67	28	35	2	0	100	15	33	40	16	31	50

C—Percentage of physicians in a specialty who were certified by an American specialty board or general practitioners with membership in American Academy of General Practice.

E—Percentage of physicians eligible for board certification or with membership in a recognized national specialty organization.

illustrates what percentage of physicians were eligible or certified, by age group. The proportion that was board certified was highest among physicians in the age group 46-55 years (49 percent), and the proportion that was eligible was highest in the age group 25-35 years (51 percent).

Specialty practices with high proportions of diplomates (more than 40 percent) included: orthopedic surgery—76 percent, neurosurgery—73 percent, pathology—69 percent, otolaryngology—62 percent, radiology—60 percent, ophthalmology—57 percent, pediatrics—49 percent, anesthesiology—43 percent, obstetrics-gynecology—42 percent, and urology—42 percent (table 4).

Physician-population ratios. To gain insight into the availability of physicians' services, the practicing physicians were distributed by census tracts and study districts. Rates for the number of practicing physicians per 100,000 population were computed by districts and by whether the physician had a private or a hospital office.

Table 5 shows that the number of practicing

physicians in the Baltimore SMSA was 2,085 and that the calculated rate per 100,000 population was 106.3. The rate for physicians in the primary care group was 67.3, of whom pediatricians had the lowest rate—7.5—and specialists in internal medicine, the highest—19.4. All other specialists as a group had a rate of 39.0, neurosurgeons having the lowest rate—1.1—and psychiatrists, the highest—10.1.

There were 2,212 other active physicians in the Baltimore SMSA. The number of interns and residents was 1,320, or 67.3 per 100,000. There were also 406 physicians in the SMSA with fellowships, a rate of 20.7. Fifty additional practicing physicians served in government installations not separately identified and in other facilities, giving a rate of 2.5. Nonpracticing licensed physicians numbered 436, or a rate of 22.2.

There were 93.8 practicing physicians with private offices per 100,000 SMSA population and 12.4 with offices in hospitals.

As expected, Baltimore City had the most favorable rates of practicing physicians in the

**percentages board eligible
SMSA, May 1968**

56-65 years			Over 65 years		
Num- ber	Percent		Num- ber	Percent	
	C	E		C	E
412	34	36	238	34	27
68	16	7	60	12	3
344	38	42	178	41	31
206	33	48	101	38	33
58	31	57	28	43	29
74	32	49	43	33	33
24	22	48	14	36	21
50	41	35	16	44	50
138	44	33	77	45	36
34	44	56	12	43	33
24	22	52	10	20	50
13	54	23	2	100	0
5	40	40	3	0	100
5	100	0	2	100	0
11	64	9	13	39	46
14	42	36	10	60	10
4	50	50	9	100	0
2	100	0	0	0	0
4	100	0	4	25	75
22	26	9	12	25	50

¹ See footnote, table 2.

NOTE: The percentages are based on number of physicians in the age group.

Baltimore SMSA. The number of practicing physicians of all kinds per 100,000 population was 160.0 (table 6). The primary care group had a rate of 96.7. The rates for pediatrics (8.1) and for internal medicine (30.2) were more favorable in the city than for the SMSA as a whole, but these specialties held the same rank position in both, that is, the rate for pediatrics was the lowest and the rate for internal medicine, the highest. The rate in Baltimore City for all other specialties as a group was 63.4, the lowest rate being for neurosurgery (2.3) and the highest for psychiatry (14.7).

There were 1,993 other active physicians in Baltimore City, or 219.1 per 100,000. The number of interns and residents was 1,178. There were 381 physicians in the city with fellowships. Fifty additional practicing physicians served in government installations. Nonpracticing physicians numbered 384.

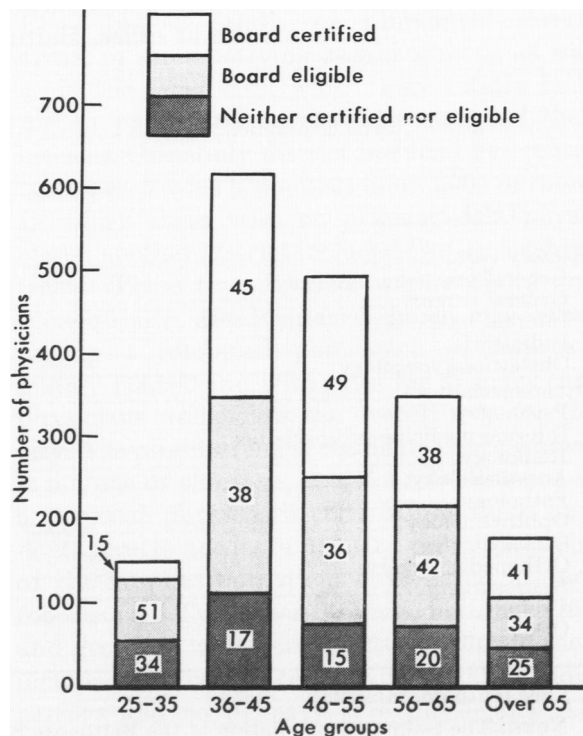
Among the 15 study districts within Baltimore City, the rates of practicing physicians ranged from 25.8 in district 6 to 504.1 in district 9. The rates for primary care physicians

ranged from 25.8 in district 6—all of the practicing physicians were in primary care—to 265.0 in district 9. The practicing physicians in district 9 were nearly evenly distributed between primary care (296) and other specialties (267). There were also 92 other active physicians in district 9—65 interns and residents and 27 nonpracticing physicians (table 6).

Fifteen census tracts, distributed over six districts, each had a population of 5,000 or more and no primary care physician (table 7). Eleven of these 15 census tracts were in four districts—3, 8, 10, and 13—in which the rates for primary care physicians fell below the mean rate of 96.7 for Baltimore City.

Baltimore County had a rate of practicing physicians of only 68.1, although two of its districts had relatively high rates; the western district had a rate of 101.6 and the central, a rate of 102.2. The county's eastern district had a low rate of 30.9; the northern district, a rate of 53.4. Of all county districts, the north-

Figure 2. Distribution of practicing physicians, except general practitioners, by age group, with percentage board eligible and board certified, Baltimore SMSA, May 1968



ern district of Anne Arundel County had the lowest rate—27.2.

Physicians rendering patient care. Because interns and residents, as well as physicians in primary care practice, render a substantial amount of care to patients, physician-to-population ratios were computed for the combined group. There were 1,320 interns and residents and 1,320 primary care physicians in the SMSA in May 1968, giving a total of 2,640 persons rendering care and a rate of 134.6 for the combined group. The rate for the combined group in Baltimore City was 226.2, or 133 percent greater than the rate for primary care physicians alone. In the city, however, four of the 15 study districts had no interns and residents to supplement the primary care physicians. Conversely, two census tracts in district 9 had a high concentration of “in town” specialists who served the entire metropolitan population. Therefore, in calculating the rate for the combined group in district 9, the physicians and populations in these two census tracts were excluded so that the ratio between (a) the physicians rendering care to patients and (b) the population of the district would be more realistic. Table 8 shows the number and rate

per 100,000 population for the combined group of primary care physicians and residents and interns in the Baltimore SMSA, in Baltimore City, in the study districts in the city with the highest and lowest rates, and in district 9.

Discussion

Statistics for 1966 show that Maryland had a generous share of the nation's physicians based on its share of the nation's population. The rate of active physicians in Maryland in that year was 167 per 100,000, compared with 138 per 100,000 for the nation. Maryland's rate exceeded the nation's by 21 percent, and only five other States had higher rates—California, Vermont, Connecticut, Massachusetts, and New York. The rate in 1966 for the Baltimore SMSA—219—compared favorably with the average rate for all SMSA's in the nation—166 (5). These are impressive statistics for Maryland and the Baltimore area and could conceivably suggest that, although the nation is experiencing a severe shortage of physician manpower, Maryland is comparatively exempt from the intricate difficulties of providing its population with adequate medical care.

Table 5. Distribution of physicians and rates per 100,000 population, by type of practice and site of office, Baltimore SMSA, May 1968

Type of practice	Total		Private office		Hospital office	
	Number	Rate	Number	Rate	Number	Rate
Total.....	2, 085	106. 3	1, 841	93. 8	244	12. 4
Primary care.....	1, 320	67. 3	1, 232	62. 8	88	4. 5
General practice.....	281	14. 3	276	14. 0	5	. 3
General surgery.....	278	14. 2	258	13. 2	20	1. 0
Internal medicine.....	380	19. 4	336	17. 2	44	2. 2
Pediatrics.....	148	7. 5	141	7. 1	7	. 4
Obstetrics-gynecology.....	233	11. 9	221	11. 3	12	. 6
Other specialties ¹	765	39. 0	609	31. 1	156	7. 9
Psychiatry.....	198	10. 1	151	7. 7	47	2. 4
Internal medicine subspecialties.....	81	4. 1	72	3. 7	9	. 4
Radiology.....	68	3. 5	37	1. 9	31	1. 6
Anesthesiology.....	83	4. 2	70	3. 6	13	. 6
Pathology.....	42	2. 2	15	. 8	27	1. 4
Ophthalmology.....	65	3. 3	59	3. 0	6	. 3
Otolaryngology.....	53	2. 7	50	2. 5	3	. 2
Orthopedic surgery.....	53	2. 7	50	2. 5	3	. 2
Neurosurgery.....	22	1. 1	18	. 9	4	. 2
Urology.....	33	1. 7	31	1. 6	2	. 1
Other.....	67	3. 4	56	2. 9	11	. 5

¹ See footnote, table 2.

NOTE: The estimated population of the Baltimore SMSA in 1965 was 1,961,960.

Table 6. Distribution of physicians and rates per 100,000 population, by type of practice, in Baltimore City and the 2 study districts of the city with the lowest and highest rates for practicing physicians, May 1968

Type of practice	Baltimore City		District 6		District 9	
	Number	Rate	Number	Rate	Number	Rate
Primary care and other specialties.....	1, 457	160. 0	6	25. 8	563	504. 1
Primary care.....	880	96. 7	6	25. 8	296	265. 0
General practice.....	143	15. 7	3	12. 9	23	20. 6
General surgery.....	218	24. 0	0	0	102	91. 3
Internal medicine.....	275	30. 2	1	4. 3	96	86. 0
Pediatrics.....	74	8. 1	1	4. 3	5	4. 5
Obstetrics-gynecology.....	170	18. 7	1	4. 3	70	62. 7
Other specialties ¹	577	63. 4	0	0	267	239. 1
Psychiatry.....	134	14. 7	0	0	73	65. 4
Internal medicine subspecialties.....	68	7. 5	0	0	35	31. 3
Radiology.....	59	6. 5	0	0	20	17. 9
Anesthesiology.....	38	4. 2	0	0	5	4. 5
Pathology.....	30	3. 3	0	0	9	8. 1
Ophthalmology.....	52	5. 7	0	0	33	29. 5
Otolaryngology.....	42	4. 6	0	0	22	19. 7
Orthopedic surgery.....	47	5. 2	0	0	22	19. 7
Neurosurgery.....	21	2. 3	0	0	17	15. 2
Urology.....	30	3. 3	0	0	16	14. 3
Other.....	56	6. 2	0	0	15	13. 4
Other active physicians ²	1, 993	219. 1	0	0	92	82. 4
Additional practicing physicians ³	50	5. 5	0	0	0	0
Nonpracticing physicians.....	384	42. 2	0	0	27	24. 2
Interns and residents.....	1, 178	129. 5	0	0	65	58. 2
Fellows.....	381	41. 9	0	0	0	0

¹ See footnote, table 2.

² Not included in total.

³ In government installations not separately identified, and so forth.

NOTE: Estimated 1966 population: Baltimore City—910,000, district 6—23,293, district 9—111,685.

The rates cited are crude measures of physician manpower and are greatly influenced by the proportion of physicians in the count who are in training. In the nation, 18 percent (5) of the active physicians were in training, whereas in the Baltimore SMSA the proportion was 40 percent. A sensitive index for measuring the availability of private care is the rate of privately practicing physicians per 100,000 population. The overall rate in 1966 of privately practicing physicians beyond training in the Baltimore SMSA—97—compared unfavorably with the rate for all SMSA's—107 (5). Although the Baltimore SMSA rate was just 9 percent below the mean SMSA rate, the imbalanced distribution of physicians in the Baltimore City area resulted in grossly deficient physician manpower in some neighborhoods.

For many persons, the availability of physicians' services depends upon the accessibility of the sites that deliver medical care. Our major concern was physician manpower in Baltimore

City. In our study, we pinpointed several areas, in some outlying neighborhoods as well as in the inner city, which were totally lacking in physicians' services for many of their citizens. One study district included five census tracts, each with a population of 5,000 or more, in which there were no primary care physicians; another district included two such census tracts. These two districts were socially and economically disadvantaged inner city areas having a combined population of approximately 174,000 and with rates for primary care physicians well below the overall rate for the city. The plight of many residents in these areas is not one of shortage, but of a total absence of a personal physician's care. Might these residents receive adequate primary care from some of the hospital outpatient clinics that are not too distant? Two other districts, both outlying and growing, which are relatively affluent, each included two census tracts with 5,000 or more persons and no primary care physicians. Al-

though physicians tend to set up practices in more affluent areas, evidently there is a time lag.

The present national ratio of practitioners in specialties to those in general practice is 80 to 20 (6); in the Baltimore SMSA, it is 87 to 13. This trend must be reversed if we are to provide a system of total health care. It is hoped that the newly approved Board of Family Practice will serve to bring a better distribution of the physicians seeking specialty training and those concentrating on general practice. Baltimore City has only 143 generalists (9 percent of the practicing physicians in the city), but the reports on physician utilization issued by the Medical Assistance Program (title XIX of the 1965 Social Security amendments) show that at least 300 physicians in the city have a practice similar to that of a general practitioner.

The results of the Baltimore SMSA manpower survey demonstrate how unplanned the distribution of physicians is by location and specialty. We hope that the results from studies such as ours can be a guide in influencing the number and the distribution of physicians as well as their type of practice. But coordinated planning by medical organizations, public health officials, and governmental authorities will be required.

Immediate and Prospective Uses of Study

The data collected for our study were used to produce a list of physicians by census tract which has proved to be a valuable reference source. Prepared by computer printout, the list contains a 1-line entry for all practicing physicians in the Baltimore SMSA, showing each physician's name, primary professional address, whether the physician has a second address, his specialty, whether he is a Medical Assistance Program participant (a later printout gave the Medicaid vendor number), and his hospital affiliations. Biographical data included are the birth year, the year licensed, years in practice, whether he is certified by an American specialty board, and his professional organizations. The list is ordered by specialty within the census tract and within the district. Thus, the printout for any one census tract gives all the general practitioners (in alphabetical order), followed by all the general surgeons, the specialists in internal medicine, the obstetrician-

Table 7. Study districts in Baltimore City with census tracts having 5,000 or more population and no primary care physicians, May 1968

District No.	Primary care physicians per 100,000	Practicing physicians per 100,000	Number of census tracts with no primary care physicians
3-----	79.1	128.4	5
8-----	79.5	160.3	2
9-----	265.0	504.1	2
10-----	67.4	102.2	2
13-----	38.3	60.9	2
14-----	163.1	261.3	2
Baltimore City-----	96.7	160.0	15

Table 8. Number of physicians rendering substantial care to patients and rates per 100,000 population in the Baltimore SMSA, Baltimore City, the 2 study districts of the city with the highest and lowest rates, and district 9, May 1968

Area	Number in group			Rate
	Interns and residents	Primary care physicians	Both groups	
SMSA-----	1,320	1,320	2,640	134.6
Baltimore City--	1,178	880	2,048	226.2
District 8-----	306	61	369	478.4
District 6-----	0	6	6	25.8
District 9-----	65	68	133	128.6

gynecologists, pediatricians, allergists, and so on.

To our knowledge, this resource is the only listing of physicians in a greater metropolitan area arranged by census tract. These data have been of great value to the medical care services section of the Baltimore City Health Department in its efforts to assist needy citizens in obtaining available medical care. The list of physicians and the Medical Assistance Program reports on physician utilization formed the basis for a system of referring patients to physicians. Primary care physicians and physicians combining a general practice with a specialty were selected for the referral panel from the

physician utilization reports. Since the list of physicians was arranged by census tract, physicians on the panel could be arranged in the same way; those physicians with several office locations were listed in all the appropriate census tracts. Information about a physician on the panel included his name, address, and kind of practice. If a patient eligible for medical assistance calls for the name of a physician participating in the Medical Assistance Program, the census tract of the patient's address is quickly located. By using a city map showing census tracts and consulting the referral panel, the staff of the medical care services section can offer the patient the names and addresses of the three nearest physicians.

The list of physicians by census tract has served also as a referral source for other persons and agencies requiring data on small areas. Several community agencies have used it in planning improved medical services for residents of the metropolitan area.

Summary

A study, begun in 1967 in the Baltimore Standard Metropolitan Statistical Area (SMSA) to assess physician manpower at the census tract level, sought to identify each physician in the area and then to determine whether he was in training or beyond the training stage. Physicians beyond the training stage were sent a self-administered questionnaire. For counts of interns, residents, and fellows, inquiries were made to all hospitals in the SMSA. Each physician was subsequently mapped into his census tract and into a study district according to his professional address.

There were 4,297 active physicians in the SMSA, 40 percent of whom were in hospital training. Of the 60 percent beyond the training stage, the ratio of practicing to nonpracticing physicians was about 4 to 1. Of the practicing physicians in the SMSA, 13 percent were general practitioners and 87 percent were specialists. Almost two-thirds of the physicians were engaged in primary care—general practice, general surgery, internal medicine, pediatrics, or obstetrics-gynecology. Of those in a specialty-type practice, 42 percent were certified by an American board. Eighty-eight percent had private office locations.

The ratio of physicians in specialty practice to those in general practice was 87 to 13 in the SMSA, compared with 80 to 20 for the nation. In Baltimore City, only 9 percent of the practicing physicians were in general practice. Moreover, the proportion of physicians in general practice was smaller in the younger age groups than in the older.

The rate of practicing physicians in the SMSA per 100,000 was 106.3; in Baltimore City, 160.0. The rate of primary care physicians in the SMSA was 67.3; in Baltimore City, 96.7. The rate for the combined group of interns, residents, and primary care physicians in the SMSA was 134.6; in Baltimore City, 226.2.

Among the 15 study districts within Baltimore City, the rates of practicing physicians ranged from 25.8 to 504.1; the rates of primary care physicians, from 25.8 to 265.0. Fifteen census tracts in the inner city as well as in some outlying areas totally lacked primary care physicians. The results of the survey demonstrate how unplanned the distribution of physicians was by specialty and location.

REFERENCES

- (1) Andersen, R., and Anderson, O. W.: A decade of health services. University of Chicago Press, Chicago and London, 1967.
- (2) National Center for Health Statistics: Volume of physician visits—United States, July 1966–June 1967. PHS Publication No. 1000, Ser. 10, No. 49. U.S. Government Printing Office, Washington, D.C., November 1968.
- (3) Bashshur, R. L., Shannon, G. W., and Metzner, C. A.: The application of three-dimensional analogue models to the distribution of medical care facilities. Paper presented at 97th annual meeting of American Public Health Association, Philadelphia, Nov. 12, 1969.
- (4) Annual vital statistics report, Maryland 1966. Division of Biostatistics, Maryland State Department of Health, Baltimore, 1967.
- (5) Theodore, C. N., and Sutter, G. E.: Distribution of physicians, hospitals and hospital beds in the U.S. American Medical Association, Department of Survey Research, Chicago, 1966.
- (6) American Academy of General Practice concern cited. *AMA News*, Apr. 14, 1969, p. 6.

Tearsheet Requests

Mrs. Alma W. McMillan, Medical Care Services, Baltimore City Health Department, 200 East Lexington Street, Baltimore, Md. 21202

Physician's Assistants

The Board on Medicine of the National Academy of Sciences, in a 14-page report entitled "New Members of the Physician's Health Team: Physician's Assistants," has concluded that the quickest way to relieve the national shortage of physicians is through wide use of physician's assistants who could examine patients and do numerous other tasks now performed by physicians.

The board endorses the concept of three types of assistants, each having different levels of training and responsibilities. It cautions against the premature enactment of licensing laws that would establish rigid job qualifications before the full potential usefulness of the assistants has been determined.

The most highly trained type of assistant, who probably would be called the physician's associate, would be qualified to do work that involves some independent medical judgment. Under the physician's supervision, he could in some cases even make a diagnosis and perform therapy, with the range of these responsibilities increasing as he develops new skills on the job.

"There must be major changes in the organization of health care delivery," the board said, to resolve the problem of unequal distribution of health care and to alleviate the physician shortage, which is currently estimated at 50,000. The employment by physicians of well-trained assistants and the upgrading and better utilization of other paraprofessionals are essential if such changes are to be made.

The report calls for the cooperation of the American Medical Association, the Association of American Medical Colleges, and the Government in eliminating legal barriers and establishing standards for education, testing, and certification of physician's assistants. It offers guidelines in these areas.

Rather than licensure, the report recommends a system of registration that would permit physicians to employ assistants who have completed an ap-

proved program or otherwise established their qualifications.

Possession of a high school diploma should be an adequate prerequisite for training to become physician's assistants, according to the report. It suggests varying amounts of education, clinical experiences, and on-the-job training for the three types of assistants. For physician's associates, it recommends the equivalent of 2 years of professional-level classroom and clinical work. Medical corpsmen, approximately 30,000 of whom are discharged from the military services each year, and other medical workers who enter the training program should be allowed credit for the clinical knowledge they already have acquired.

Another type of assistant, who would be highly skilled in one type of clinical specialty or procedure within a specialty (such as the operation of a renal dialysis unit), would receive most of this training from physicians specializing in his area of concentration. The third type mentioned in the report, nonspecialized personnel who would be to medicine what the practical nurse is to nursing, could receive much of his clinical training on the job.

The report names nine schools that currently are training physician's assistants in experimental programs and one that plans to begin soon. It stresses that these do not make up a complete list but are given as examples of the operation of such programs.

Of the nine schools, five graduated 132 students as of December 1969, with 90 of the graduates trained for the merchant marine by the Purser-Pharmacist Mate School at the Public Health Service Hospital in Staten Island, N.Y. The other programs that graduated students are at Duke University Medical Center, 29; Grady Memorial Hospital at Emory University, seven; the Federal Health Programs Service in Springfield, Mo., four; and the University of Alabama, two.