

Primary Care Physicians in Underserved Areas Family Physicians Dominate

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Using the definitions of "medically underserved areas" developed by the California Health Manpower Policy Commission and data on physician location derived from a survey of California physicians applying for licensure or relicensure between 1984 and 1986, we examined the extent to which different kinds of primary care physicians located in underserved areas. Among physicians completing postgraduate medical education after 1974, board-certified family physicians were 3 times more likely to locate in medically underserved rural communities than were other primary care physicians. Non-board-certified family and general physicians were 1.6 times more likely than other non-board-certified primary care physicians to locate in rural underserved areas. Family and general practice physicians also showed a slightly greater likelihood than other primary care physicians of being located in urban underserved areas.

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For more than two decades, public policy has promoted programs designed to establish the medical specialty of family practice. Two assumptions underlie these policy initiatives: first, that there exists a geographic maldistribution of physicians, and, second, that physician residency programs organized in specific ways can prepare physicians for practice in communities that lack the full range of medical services available in affluent urban areas.

The idea of geographic maldistribution further implies that specific geographic areas—usually rural or inner city—exist that are relatively deficient in primary care physicians and possibly other medical resources as well. Little research has been done to examine these assumptions in detail, in part because researchers have lacked the tools to delineate medically underserved areas with sufficient precision.

Specifically, a few studies have been done comparing the extent to which graduates of family practice, internal medicine, general pediatrics, and other primary and non-primary care residency programs locate in more rural areas or areas of lower physician density.^{1,3} When family practice residency graduates have been compared with other primary and non-primary care residency graduates, they have been found to have a greater likelihood of choosing a rural practice site. Not all rural areas are necessarily medically underserved, however, and none of these studies considered urban underserved areas.

Studies concerning the extent to which graduates of family practice residency programs have alleviated geographic maldistribution with respect to explicitly defined underserved areas have been limited to small numbers of family practice graduates, typically from a single institution, or a relatively brief time after graduation from the residency and without making comparisons with other types of physicians.^{4,9}

The State of California developed two data sources that allowed us to avoid the drawbacks faced by previous studies of not having explicitly defined rural and urban underserved areas or a large number of physicians, most of whom have been practicing for several years. The objective of this study was to use these data to measure the relative extent to which different types of primary care residency programs are contributing to solving the physician maldistribution problem.

Physicians and Methods

The State of California licenses physicians for a two-year period. Renewal periods are staggered so that an average of 4% of all California licensees must apply for renewal each month. During the period July 1984 through June 1986, the state required all physicians renewing their California license to answer a questionnaire. A questionnaire was sent to only those physicians applying for relicensure. Omitting first-time applicants for licensure reduced the proportion of respondents who might still be serving their residency. Any relicensure

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ABBREVIATIONS USED IN TEXT

HPSA = health professional shortage area
MSSA = medical service study area

applicants who did not fill out the questionnaire had their application returned to them,¹⁰ thus ensuring a 100% response rate. There were 77,761 respondents, 50,677 of whom reported being in practice or employed in California. Our study further restricted itself to examining the practice location of physicians who completed their postgraduate education after 1974. Of the 50,677 California physicians, 20,275 physicians had done so.

The questionnaire required physicians to indicate their specialty, whether they were board certified, the date of last postgraduate training, and practice location. The questionnaire required respondents to choose one specialty from an accompanying list. Of the 20,275 physicians, 8,345 indicated their specialty as either family or general practice, obstetrics and gynecology, internal medicine, or pediatrics. These physicians constituted the group that we examined in this study. Because the first family practice residency was approved in 1968, only a small number of family physicians would be residency-trained before that date.

Among physicians with board certification, there ought not to be any general practitioners. A small percentage of general practitioners indicated they were board certified, however (3.6%). The percentage of obstetricians and gynecologists who indicated they were gynecologists only (rather than both) was also small: 9.6%. The findings proved virtually the same whether or not these two groups were included in the analysis. We included them in the data presented in this study.

By California statutes, the California Health Manpower Policy Commission is required to determine which areas of the state are medically underserved. The commission developed its own method of defining underserved areas, rather than using the federally designated Health Professional Shortage Area (HPSA) definition. The commission's determination of which areas were medically underserved involved a process that combined a "rules"-based approach and political and administrative judgment. The rules approach began with census county divisions as the units of analysis. These were aggregated into "medical service study areas" (MSSAs). Medical service study areas were constructed by aggregating census county divisions that were within 20 mi of a principal population center. Census county divisions outside the 20-mi perimeter of population centers were left desegregated—each making up an MSSA. Medical service study areas were designated as "rural" if the population density was less than 250 persons per sq mi and contained no incorporated community with more than 20,000 population. They were designated as "urban" if either of these criteria did not hold. Urban MSSAs with more than 40,000 population were, in many cases—and in all cases of larger cities—further subdivided into smaller MSSAs after consulting

with local health departments. The commission then invited and responded to specific criticisms of this process and the resulting MSSA geographic pattern. The ultimate objective of the commission was to define areas in which the number of physicians practicing in the area determined the access to physician services of area residents. The result was the division of the state into 453 MSSAs, based largely on rules, but especially in urban areas, allowing judgment to influence MSSA boundaries.^{11,12}

All relicensure applicants had to indicate their primary practice location, including zip code, on the questionnaire. The zip code of the primary practice location was used to assign physicians to MSSAs.

The population of each MSSA was then divided by the number of primary care physicians practicing in the MSSA, as determined by the licensure questionnaire. If the ratio was greater than 1,966 persons per physician, the MSSA was designated as underserved. This level is 175% of the statewide average of 1,123 persons per physician. A lower ratio of 1,855 (165% of the statewide average) was used to designate an MSSA as underserved if the percentage of the population younger than 5 years exceeded 5.5%, that older than 64 years exceeded 22.5%, or the percentage of the population with family income under the US poverty line exceeded 20%. This process was completed during 1984. There were 254 urban MSSAs, and of these, 120 (containing 41% of the urban population) were designated as underserved. There were 199 rural MSSAs, of which 158 (containing 73% of the rural population) were designated as underserved.

We tested the null hypothesis that each specialty's physicians were distributed across urban and rural underserved MSSAs in the same way as physicians in the other three specialties. We used *t* tests for the difference in proportions, comparing the proportion of physicians in each of the four specialties located in a rural underserved area with that of physicians in the other three specialties located in rural underserved areas. The same procedure was then repeated for urban underserved areas. The same steps were followed for analyzing the data for non-board-certified physicians. We treated board-certified physicians and non-board-certified physicians separately because we thought it possible that the non-board-certified physicians, as a group, contained a higher proportion of physicians who had not completed an approved residency program and that this might affect location patterns. The differences in the location pattern between board-certified and non-board-certified physicians within a primary care specialty were tested with the *t* test for the differences between two sample proportions.

In reporting the results, we give the *P* value of the two-sided *t* test, which is the probability of observing the absolute value of the difference in the proportions we obtained, or an absolutely greater value, if the null hypothesis were true—that is, the true difference in proportions is 0. The *P* values were determined using the Microsoft Excel, version 5.0, program.

TABLE 1.—Percentage and Number of Each Type of Board-Certified Primary Care Physicians Located in Adequately Served, Rural Underserved, and Urban Underserved Areas

Specialty	Board-Certified Primary Care Physicians			Total, % (No.)
	Located in Adequately Served MSSAs, % (No.)	Located in Underserved Rural MSSAs, % (No.)	Located in Underserved Urban MSSAs, % (No.)	
Family and general practice.....	57.0 (693)	15.1 (184)	27.9 (339)	100 (1,216)
Obstetrics and gynecology.....	72.7 (453)	5.6 (35)	21.7 (135)	100 (623)
Internal medicine.....	74.5 (1,796)	4.9 (118)	20.7 (498)	100 (2,412)
Pediatrics.....	74.1 (709)	4.7 (45)	21.2 (203)	100 (957)
Total primary care other than family practice.....	74.1 (2,958)	5.0 (198)	20.9 (836)	100 (3,992)
Total primary care....	70.1 (3,651)	7.3 (382)	22.6 (1,175)	100 (5,208)

MSSAs = medical service study areas

Results

Table 1 shows the percentages and number of board-certified physicians in total, with family practice physicians excluded from the total, and in each of four primary care specialties located in rural and urban medically underserved MSSAs and adequately served MSSAs. The data in the table indicate that board-certified family practice physicians are substantially more likely than other primary care specialists to be located in underserved areas.

The probability of a board-certified family practice physician locating in a rural underserved area is three times greater than that of other, non-family practice, board-certified primary care physicians as a group (15.1% versus 5.0%, $P < .0001$). The probability of family practice physicians locating in an urban underserved area is 1.33 times greater than that of other primary care physicians. Although this is a lower ratio than in the case of rural underserved areas, it is still statistically significant ($P < .0001$).

The percentages of board-certified family practice physicians located in urban and in rural underserved

areas (15.1% and 27.8%, respectively) are insignificant-ly different from those found in another study done in Fresno, California (13% and 33%, respectively).⁹ The sample of physicians in that study consisted of 126 graduates of California family practice residency programs two to five years after graduation.

Table 2 shows the proportion and number of non-board-certified physicians in each of four primary care specialties located in medically underserved MSSAs. Family and general practice physicians still have a significantly greater percentage of being located in underserved areas than do other primary care physicians ($P < .001$ for rural and $P < .04$ for urban underserved areas).

Comparing Tables 1 and 2, the percentage of all non-board-certified family and general physicians located in rural underserved areas is only 7.2%, which is less than half the 15.1% for those who were board certified ($P < .0001$). The percentage of other non-board-certified primary care physicians located in rural underserved areas (4.4%) is also lower than it is for those with board certification (5.0%), but only slightly and insignificantly lower ($P > .3$).

TABLE 2.—Percentage and Number of Each Type of Non-Board-Certified Primary Care Physicians Located in Adequately Served, Rural Underserved, and Urban Underserved Areas

Specialty	Non-Board-Certified Physicians			Total, % (No.)
	Located in Adequately Served MSSAs, % (No.)	Located in Underserved Rural MSSAs, % (No.)	Located in Underserved Urban MSSAs, % (No.)	
Family and general practice.....	64.5 (741)	7.2 (83)	28.2 (324)	100 (1,148)
Obstetrics and gynecology.....	72.7 (405)	5.3 (30)	22.6 (127)	100 (562)
Internal medicine.....	70.1 (610)	4.4 (38)	25.5 (222)	100 (870)
Pediatrics.....	70.4 (392)	3.4 (19)	26.2 (146)	100 (557)
Total primary care other than family practice.....	70.7 (1,407)	4.4 (87)	24.9 (495)	100 (1,989)
Total primary care....	68.4 (2,148)	5.4 (170)	22.6 (819)	100 (3,137)

MSSAs = medical service study areas

With respect to urban underserved areas, non-board-certified physicians have higher percentages located there. For family physicians, comparing Tables 1 and 2, the percentages of certified and non-certified physicians located in urban underserved areas are 27.9% and 28.2%, respectively. This is not significant ($P > .85$). For obstetrics and gynecology, internal medicine, and pediatrics taken together, the percentages of certified and non-certified physicians located in urban underserved areas are 20.9% and 24.9%, respectively. Although this is a significant difference ($P < .001$), most of the difference is due to internists and pediatricians. Board-certified and non-board-certified obstetricians and gynecologists have nearly the same percentage practicing in urban underserved areas (21.7% and 22.6%, respectively). The differences between board-certified and non-board-certified internists and pediatricians in the percentage practicing in underserved areas are 20.7% versus 25.5%, respectively, for internists and 21.2% versus 26.2% for pediatricians.

Discussion

The method of designating medically underserved areas used in this study differs markedly from that used for the federally designated HPSAs. There may be a strong selection bias determining which areas are designated HPSAs. The HPSA designation is made in response to an application by a person or organization in the area—often a clinic, hospital, or local public health agency. This requires investing considerable time and effort. Without this local initiative, no designation is made. Underserved areas that do not already have a local, stable, resourceful, and motivated health care organization of some type are not likely to be designated as HPSAs. Furthermore, the main requirement to be designated an HPSA is that the ratio of population to primary care physicians be greater than 3,500. From a political perspective, this is too extreme a value as a criterion for addressing inequities in access to primary care.

What explanations can be offered for the greater percentage of family physicians practicing in the designated underserved areas? First, there may be a specialty effect. Family physicians have a more general skill set than obstetrician-gynecologists, pediatricians, or internists. This implies that each family or general practice physician needs a smaller population base to provide a sufficient patient load than do the other primary care specialties. This could be a factor in explaining the relatively greater percentage of family practice physicians in rural underserved areas. Second, there may be a training effect. Family practice residency programs often are structured specifically to prepare physicians for direct patient care in ambulatory settings in communities for which there are access barriers (geographic, social, or economic) to non-primary care specialists and tertiary care services. Third, there may be a selection effect. Family practice residencies may attract young people who wish to locate in underserved areas, some of whom would have located in such areas even if they had had to

choose a residency in some other primary care specialty. Family practice residency programs often deliberately recruit residents who are thought to be predisposed to practice in communities with a shortage of physicians.

Although family practice physicians have located in underserved areas in greater proportions than other primary care specialties, the differences are less dramatic for urban areas. Two possible reasons for this are as follows: the larger population base in urban underserved areas removes the advantage of the lower population base required by family and general practice physicians relative to the other primary care specialists, and there is a greater likelihood of error in designating urban areas as underserved. A physician located on a bus route a quarter mile outside an inner-city neighborhood may be serving that neighborhood but not be counted in calculating its population-to-physician ratio. Conversely, a physician may have a location bordering a downtown business district and the edge of an inner-city neighborhood. The physician may not treat many inner-city residents, but may be counted in the denominator of the neighborhood's population-to-physician ratio. Drawing the boundary of the inner-city neighborhood a few blocks in either direction can determine the frequency of each of these types of errors. Clearly, this type of situation is less likely to arise in rural areas. In any event, overestimating or underestimating the number of MSSAs that are actually underserved (nondifferential misclassification) makes it less likely that we will obtain significant differences among the four primary care specialties in their distribution between underserved and adequately served areas, when in fact true differences exist.^{13(p86)}

Conclusion

Do family practice residency programs produce physicians who serve as the primary physician in underserved areas? The answer is a "relative" yes. Compared with other primary care specialties, family practice physicians have shown a greater willingness to locate in underserved areas, both rural and urban. We cannot in this study clearly distinguish between the specialty, training, or selection effects, however, or measure their relative importance. It seems likely that the percentage of family practice physicians who completed an approved residency program is higher for those who were board certified, relative to non-board certified. To the extent that this may be the case, the greater percentage of board-certified family practice physicians located in rural underserved areas points to the existence of a training effect. It may be possible to include the specific features of family practice residency programs that comprise the training effect, if they can be identified, in other primary care residency programs.

Many pediatricians, internists, and obstetrician-gynecologists have chosen to locate their practices in underserved areas, and together these physicians make up the majority of primary care physicians in underserved areas (71%). Whatever accounts for the higher percentage of family practice physicians locating in

underserved areas, it is clearly a question of degree, rather than an absolute distinction.

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The Thank You Note

We went to See's Candy.
 She picked
 the biggest box.
 On the note
 she wrote, "To all the great nurses!"
 and looked at me for approval.
 I read what that tiny card really said.
 "To all the great nurses,
 not the bossy one,
 not the one who left two stitches in me,
 not the one who ripped the bandage off. 'Ouch'
 No. To all the great nurses,
 the funny one
 who had long conversations
 with the IV machine,
 big fat chocolates to her.
 The night nurse who tried to be so quiet,
 the nurse who brought
 the two-day-old baby
 from the next room
 all wrapped up
 for me to see,
 to all the great nurses
 who never made me feel
 I was their job,
 to the so-patient nurses
 who explained what they were doing.
 To all the great nurses!
 Thanks."

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