

Who is Caring for the Underserved? A Comparison of Primary Care Physicians and Nonphysician Clinicians in California and Washington

Kevin Grumbach, MD^{1,2}

L. Gary Hart, PhD^{3,4}

Elizabeth Mertz, MPA¹

Janet Coffman, MPP^{1,5}

Lorella Palazzo, MA^{3,4}

¹Center for California Health Workforce Studies, University of California, San Francisco, Calif

²Department of Family and Community Medicine, University of California, San Francisco, Calif

³WWAMI Center for Health Workforce Studies, University of Washington, Seattle, Wash

⁴Department of Family Medicine, University of Washington, Seattle, Wash

⁵Health Services and Policy Analysis Program, School of Public Health, University of California, Berkeley, Calif

ABSTRACT

PURPOSE: Little is known about whether different types of physician and nonphysician primary care clinicians vary in their propensity to care for underserved populations. The objective of this study was to compare the geographic distribution and patient populations of physician and nonphysician primary care clinicians.

METHODS: This study was a cross-sectional analysis of 1998 administrative and survey data on primary care clinicians (family physicians, general internists, general pediatricians, nurse practitioners, physician assistants, and certified nurse-midwives) in California and Washington. For geographic analysis, main outcome measures were practice in a rural area, a vulnerable population area (communities with high proportions of minorities or low-income residents), or a health professions shortage area (HPSA). For patient population analysis, outcomes were the proportions of Medicaid, uninsured, and minority patients in the practice.

RESULTS: Physician assistants ranked first or second in each state in the proportion of their members practicing in rural areas and HPSAs, and in California physician assistants also had the greatest proportion of their members working in vulnerable populations areas ($P < .001$). Compared with primary care physicians overall, nurse practitioners and certified nurse-midwives also tended to have a greater proportion of their members in rural areas and HPSAs ($P < .001$). Family physicians were much more likely than other primary care physicians to work in rural areas and HPSAs ($P < .001$). Compared with physicians, nonphysician clinicians in California had a substantially greater proportion of Medicaid, uninsured, and minority patients ($P < .001$).

CONCLUSIONS: Nonphysician primary care clinicians and family physicians have a greater propensity to care for underserved populations than do primary care physicians in other specialties. Achieving a more equitable pattern of service to needy populations will require ongoing, active commitment by policy makers, educational institutions, and the professions to a mission of public service and to incentives that support and promote care to the underserved.

Ann Fam Med 2003;1:97-104. DOI: 10.1370/afm.49.

Conflict of interest: none reported

CORRESPONDING AUTHOR

Kevin Grumbach, MD
San Francisco General Hospital, Bldg 80,
Ward 83
1001 Potrero Ave
San Francisco, CA 94110
keving@itsa.ucsf.edu

INTRODUCTION

Inequities in access to care mar the landscape of health care in the United States. Many communities lack sufficient numbers of primary care clinicians.¹ In other communities with an ample supply of clinicians, many patients nonetheless have difficulty obtaining needed services because they lack health insurance or have insurance such as Medicaid that many clinicians do not accept.^{2,3}

One important objective of national health workforce policy is to pro-

duce a supply of health professionals that better meets the needs of underserved populations. This objective featured prominently in federal government decisions in the 1960s and 1970s to institute funding of training programs for family physicians, nurse practitioners, and physician assistants under the authority of Title VII and Title VIII.⁴ These federal programs later expanded to also support training in primary care, internal medicine, pediatrics, and certified nurse-midwifery. Evaluation of the distribution of primary care clinicians and their involvement in care of underserved populations is timely in view of recent proposals that would jeopardize further funding of these federal training programs.

Limited research suggests that family physicians, nurse practitioners, and physician assistants are especially likely to practice in rural communities^{1,5,6} and might be more likely to care for low-income patients.⁷⁻⁹ Other studies restricted to analyses of physician distribution have indicated that family physicians are more likely than other primary care physicians to work in rural and underserved communities.^{1,10} No study, however, has comprehensively compared the geographic distribution and patient populations of clinicians across the different primary care disciplines.

A contemporary, comprehensive head-to-head study of primary care clinicians is important in view of the changing health care environment. The only comprehensive study of the geographic distribution of nonphysician clinicians was conducted 25 years ago.¹¹ Since that time, the supply of nurse practitioners, physician assistants, and certified nurse-midwives has grown, and many states have liberalized scope of practice regulations for nonphysician clinicians,^{12,13} potentially changing the pattern of clinician location. Implementation of Title VII funding of pediatric and internal medicine training programs might also have produced shifts in physician geographic distribution since the time of earlier studies of physician distribution.

We investigated the degree to which clinicians in different primary care disciplines care for underserved populations. We compared the geographic distribution of physician and nonphysician primary care clinicians in California and Washington and examined the proportion of clinicians in each discipline practicing in underserved communities. We also investigated in more detail the patient populations served by a sample of these clinicians working in urban areas of California.

METHODS

Study of Geographic Distribution

Clinician data. The main data source for physician supply in California and Washington was the 1998

American Medical Association physician Masterfile, supplemented in Washington by information from the state licensing board and by contact verification for rural clinicians. The study was limited to physicians active in patient care, no longer in training, with a primary self-reported specialty of family practice (including general practice), internal medicine, pediatrics, or obstetrics-gynecology. Data on nonphysician clinicians were from 1998 mailed surveys,¹⁴ supplemented in Washington by additional data from the licensing board and contact verification for rural clinicians. Certified nurse-midwives were not surveyed in Washington. The survey response rate in California was 64% and in Washington, 67% for nurse practitioners and 86% for physician assistants. For the study, nurse practitioners and physician assistants were included if they reported a principal activity in primary care. Clinicians were geocoded using their listed main practice address. For the minority (less than 20% in all groups) of clinicians eligible for the study who lacked data on practice address, the preferred mailing address was used.

Geographic Areas. The geographic unit of analysis for practice location was rational service areas defined by state agencies: medical service study areas (MSSAs) in California and rural health service areas (HSAs) and urban public health department zones in Washington. All clinicians were assigned to a service area using the geocoding methods described above. Population data for each service area were obtained from census estimates for 1998 produced by Mapinfo for California and Claritas for Washington.

We used 3 different schemes for classifying areas as potentially underserved: (1) the area was a rural community, (2) the area was a vulnerable population community, or (3) the area was designated by the federal government as a primary care health professions shortage area in 1998.

Rural areas tend to have lower supplies of physicians and more difficulty recruiting physicians than urban areas. California defines rural MSSAs as those with population densities of fewer than 250 residents per square mile and containing no city of 50,000 or more residents. In Washington, rural HSAs were those with a core city or town recognized by the Washington State Department of Health as rural based on (1) not being in a metropolitan statistical area (MSA) or (2) being within an MSA but more than 30 minutes average travel time from a population base of 10,000 or more.

Vulnerable population areas are communities with relatively high proportions of minority and poor residents. Because data on population insurance status are not available at the small-area level, minority and low-income populations also serve as a proxy for areas that

have high proportions of uninsured patients.² Consistent with previous research,¹⁵ we defined vulnerable population areas as those having either a proportion of African American or Latino residents at or above the 85th percentile for communities in the state, or having a median household income in the lowest quartile for communities in the state.

Primary care health professional shortage areas (HPSAs) are designated by the federal government based on several criteria, including having fewer than 1 primary care physician for every 3,500 residents. We counted areas as a HPSA if any portion of the area was designated a geographic or population HPSA.

Analysis. We computed the percentage of clinicians in each discipline (eg, family physician, nurse practitioner) that practiced at locations in each of the 3 types of underserved classification areas as described above. Differences in percentages across the disciplines were analyzed for statistical significance using χ^2 tests. Separate logistic regression models were computed for each state to analyze the independent effect of professional discipline on the odds of practicing in an underserved community. Clinician age (both linear and quadratic terms), sex, and race-ethnicity were included as covariates in the regression models, because almost all midwives were women, midwives were not included in the regression models.

Study of Patient Populations

Of the clinician databases described above, only the California nonphysician clinician survey had information on the characteristics of patients in the clinician's

actual practice. We were able to match these data for California nonphysician clinicians with data from a survey of a sample of primary care physicians in urban California. Details of the physician sample have previously been reported.¹⁶ The survey included physicians with a primary specialty of family practice, general practice, general internal medicine, general pediatrics, or obstetrics and gynecology. The response rate was 81%. Because of the complex sampling design of the physician survey, results were weighted to be generalizable to the overall population of physicians in the sampled specialties in the 13 study counties.

The questionnaires in the primary care physician and nonphysician clinician surveys included similarly worded questions about practice setting and about the race-ethnicity and insurance coverage of patients in the clinicians' practice. For the nonphysician clinicians, survey data from respondents in the same 13 counties included in the physician survey were used for the comparison with physician survey data. Comparisons of responses to these items across clinician groups were analyzed using χ^2 tests for categorical variables and analysis of variance for continuous variables.

RESULTS

Study of Geographic Distribution

The demographic characteristics of the clinicians in the geographic analysis are displayed in Table 1. In both California and Washington, physician assistants had the greatest proportion of their members practic-

Table 1. Clinician Characteristics

	Number	Percent Female	Percent Race, Ethnicity					Age, Years Mean (SD)	
			African American	Asian	Hispanic	White	Other		Missing
California									
Family physicians	8,153	20.3	1.8	13.2	4.7	45.4	1.9	33.1	53.1 (12.5)
General pediatricians	4,462	44.9	2.1	17.7	3.7	40.0	2.1	34.5	49.1 (10.8)
General internists	7,984	23.5	2.1	15.7	2.6	39.8	2.6	37.2	48.9 (11.4)
Obstetrician-gynecologists	3,693	27.9	3.9	13.7	3.9	48.5	1.5	28.5	51.8 (11.1)
Nurse practitioners	2,509	96.1	3.7	7.0	6.7	78.6	3.1	0.9	46.4 (8.2)
Physician assistants	833	54.6	7.8	7.7	15.7	62.4	4.8	1.6	43.5 (8.3)
Certified nurse-midwives	419	98.6	4.3	2.9	4.1	84.3	2.7	1.9	45.6 (7.1)
Washington									
Family physicians	2,323	24.8	0.8	6.7	2.0	75.8	7.3	7.4	47.7 (10.3)
General pediatricians	637	41.9	0.9	9.7	2.2	69.9	8.5	8.8	46.9 (10.2)
General internists	1,164	29.7	0.9	10.1	2.1	68.6	6.9	11.3	44.8 (10.1)
Obstetrician-gynecologists	569	33.9	2.1	8.1	1.9	74.9	5.4	7.6	48.4 (10.0)
Nurse practitioners	442	92.1	0.9	3.2	1.8	89.6	3.2	1.4	47.1 (7.4)
Physician assistants	485	38.8	2.7	5.8	4.5	81.6	4.5	0.8	45.4 (8.8)

SD = standard deviation.

ing in rural communities (Table 2). Twenty-two percent of physician assistants in California and 28% of physician assistants in Washington were located in rural areas. These percentages compare with 13% and 24% of the overall population in California and Washington, respectively, who reside in rural areas. In California, similar proportions of family physicians (13%), nurse practitioners (15%), and certified nurse-midwives (16%) practiced in rural communities. Family physicians in California had about a twofold greater proportion of their members practicing in rural areas compared with pediatricians, internists, and obstetrician-gynecologists. In Washington, a much greater proportion of family physicians also practiced in rural areas compared with physicians in the other specialties and, in contrast with the pattern in California, were more likely than nurse practitioners to practice in rural communities.

It is important to note that the data shown in Table 2 indicate the proportion of clinicians within each discipline who practice in a rural area and do not indicate the proportion of all clinicians in rural areas who belong to each discipline. For example, Table 2 indicates that 22% of physician assistants in California work in rural areas, not that 22% of all rural clinicians in California are physician assistants.

In California, physician assistants also had the

greatest proportion of their members (48%) practicing in communities with vulnerable populations (Table 2). Certified nurse-midwives (41%) had the second highest proportion of its members practicing in vulnerable population communities in California. The percentages of clinicians working in vulnerable population communities clustered more closely for the remaining groups of clinicians in California. Fewer differences across disciplines in the likelihood of practicing in a vulnerable population area existed in Washington. The percentage of clinicians working in vulnerable population communities in Washington ranged from 55% for internists to 44% for pediatricians.

In California and Washington, 28% and 39% of the population, respectively, resided in primary care HPSAs (Table 2). On this measure of underserved populations, physician assistants also distinguish themselves with their relatively high distribution in HPSA communities. In California, physician assistants and certified nurse-midwives had the greatest proportion of their members practicing in HPSAs. In Washington, physician assistants and family physicians had the greatest likelihood of working in HPSAs.

Rural areas are much more likely than urban areas to be designated as a HPSA. We therefore stratified the analysis of HPSA practice location by urban and rural classification to determine whether the HPSA

distributional patterns were mainly explained by differences across clinician groups in the likelihood of practicing in a rural location. In both states, among rural clinicians there were relatively small differences between disciplines in the likelihood of practicing in a HPSA. About one half of all rural clinicians in California practiced in a HPSA, with the exception of rural physician assistants, who had a somewhat greater likelihood (60%) of working in a HPSA. In Washington, about three quarters of all rural clinicians practiced in a HPSA.

The relative probability of practicing in a HPSA varied more for urban clinicians. In California, family physicians and clinicians in the 3 nonphysician groups were more likely than internists, pediatricians, and obstetrician-gynecologists to practice in an urban HPSA (Table 3). In Washington, urban family physicians were also more likely than their urban counterparts to practice in a

Table 2. Percentage of Clinicians in Each Discipline Practicing in Underserved Areas, by Type of Underserved Area

	Rural Area % (95% CI)	Vulnerable Population Area % (95% CI)	HPSA % (95% CI)
California			
Population*	13.0	39.0	28.0
Family physicians	13.2 (12.5-13.9)	30.5 (29.5-31.5)	24.2 (23.3-25.1)
General pediatricians	6.2 (5.5-6.9)	31.0 (29.6-32.4)	18.6 (17.5-19.7)
General internists	5.9 (5.4-6.4)	31.5 (30.5-32.5)	17.9 (17.1-18.7)
Obstetrician-gynecologists	6.3 (5.5-7.1)	28.3 (26.8-29.8)	16.9 (15.7-18.1)
Nurse practitioners	15.0 (13.6-16.4)	34.4 (32.5-36.3)	26.3 (24.6-28.0)
Physician assistants	21.7 (18.9-24.5)	47.7 (44.3-51.1)	35.2 (32.0-38.4)
Certified nurse-midwives	15.5 (12.0-19.0)	41.1 (36.4-45.8)	35.3 (30.7-39.9)
Washington			
Population*	24.0	40.0	38.6
Family physicians	23.6 (21.8-25.3)	45.6 (43.5-47.6)	43.5 (41.5-45.6)
General pediatricians	14.3 (11.5-17.1)	43.5 (39.6-47.4)	32.8 (29.1-36.5)
General internists	13.8 (11.8-15.9)	54.5 (51.6-57.4)	28.4 (25.8-31.1)
Obstetrician-gynecologists	13.7 (10.8-16.6)	52.9 (48.7-57.1)	31.6 (27.7-35.5)
Nurse practitioners	19.7 (15.9-23.5)	51.8 (47.0-56.6)	37.3 (32.7-42.0)
Physician assistants	27.8 (23.7-31.9)	50.3 (45.8-54.7)	42.1 (37.6-46.6)

CI = confidence interval, HPSA = primary care health profession shortage area.

*Percent of state's population residing in each type of underserved area.

P < .001 for comparisons of percentages across disciplines in each state for each type of underserved area.

Table 3. Percentage of Clinicians in Each Discipline Practicing in Health Professions Shortage Area (HPSA), Stratified by Urban vs Rural Location

	Rural Clinicians in a HPSA % (95% CI)	Urban Clinicians in a HPSA % (95% CI)
California		
Family physicians	48.8 (45.8-51.8)	20.5 (19.5-21.4)
General pediatricians	49.3 (43.3-55.2)	16.6 (15.5-17.8)
General internists	49.2 (44.6-53.7)	15.9 (15.1-16.7)
Obstetrician-gynecologists	47.0 (40.5-53.5)	14.9 (13.7-16.1)
Nurse practitioners	51.1 (46.0-56.1)	22.0 (20.2-23.7)
Physician assistants	60.3 (53.1-67.6)	28.3 (24.8-31.8)
Certified nurse-midwives	50.0 (37.6-62.4)	32.6 (27.7-37.5)
Washington		
Family physicians	79.2 (75.7-82.7)	32.5 (30.3-34.7)
General pediatricians	78.0 (69.0-87.1)	25.3 (21.5-29.0)
General internists	78.3 (71.6-84.9)	20.4 (17.9-23.0)
Obstetrician-gynecologists	73.1 (62.6-83.6)	25.1 (21.1-29.0)
Nurse practitioners	83.9 (75.6-92.2)	25.9 (21.2-30.6)
Physician assistants	80.0 (72.9-87.1)	27.4 (22.6-32.2)

CI = confidence interval.

HPSA. Thus, the greater likelihood of physician assistants, certified nurse-midwives, nurse practitioners, and family physicians practicing in a HPSA is attributable to a greater tendency among these clinicians to practice in rural areas in general and, among urban clinicians, to a greater probability of practicing in urban neighborhoods with physician shortages.

The differences in practice locations according to professional discipline observed on crude analyses were replicated in the regression models that adjusted for differences in the sex, race-ethnicity, and age of clinicians by discipline (Table 4). Consistent with previously published research,^{1,15} the regression models for both states also indicated that female clinicians had a lower odds of practicing in rural areas and HPSAs, and Latino and African American clinicians had greater odds of practicing in HPSAs and vulnerable population areas. We also repeated the crude analyses excluding physicians and nonphysician clinicians without listed office addresses, with no change in the patterns of results.

Study of Patient Populations

Survey data were available for 228 family physicians, 174 general pediatricians, 183 general internists, 128 obstetrician-gynecologists, 1,791 nurse practitioners, 546 physician assistants, and 298 certified nurse-midwives practicing in urban California. About 1 in 5 to 1 in 6 nonphysician clinicians worked in a community clinic, in contrast with fewer than 1 in 20 primary care physicians (Table 5).

Consistent with these differences in practice settings, nonphysician clinicians were more likely than primary care physicians to care for patients enrolled in the California Medicaid program (Table 5). For example, certified nurse-midwives had a mean of 43% of their patients insured by Medicaid, compared with a mean of 14% for obstetrician-gynecologists. Among nonphysician clinicians, certified nurse-midwives had the highest proportion of Medicaid patients; among physicians, pediatricians and obstetrician-gynecologists had the highest proportion of Medicaid patients. Nonphysician clinicians also had greater proportions of uninsured and minority patients in their practices compared with primary care physicians.

DISCUSSION

Our study is the first to directly compare geographic distribution and patient populations among this large variety of primary care disciplines. We found substantial differences across primary care clinician groups in California and Washington in their degree of involvement with underserved populations as measured by geographic distribution and patients served. In general, a higher proportion of nonphysician primary care clinicians than physicians practiced in underserved areas and cared for large numbers of minority patients and patients who are Medicaid beneficiaries or uninsured. Physician assistants, in particular, had a relatively large proportion of their members practicing in rural communities, in communities with a high proportion of low-income or minority residents, and in HPSAs. Among primary care physicians, family physicians were much more likely than internists, pediatricians, and obstetrician-gynecologists to practice in rural communities and in HPSAs. Our findings are consistent with those of studies from earlier eras and those of more limited scope^{1,5-11}.

It is important to note that the actual number of clinicians in a discipline working in underserved areas is a product of both the proportion of the clinicians in the discipline working in an underserved area and the total number of clinicians in the discipline. Although nonphysician clinicians have the greatest relative likelihood of practicing in rural areas and HPSAs, family physicians have the greatest absolute number of clinicians working in HPSAs and rural areas because there are more family physicians overall in each state, and family physicians have a relatively high propensity to practice in these communities.

Our study has several limitations. The nonclinician databases were less complete than the physician databases because the former relied on state surveys rather than a universal profession-administered data-

base. In both types of data sets, some clinicians lacked information on office address. When we compared the ZIP codes of the preferred mailing address and office address for physicians in California who listed both addresses, however, 84% of these physicians had both addresses in the same ZIP code. In addition, our finding that our results did not change when we excluded physicians and nonphysicians with only preferred mailing addresses suggests that our findings are not likely to be biased by possible misas-

signment of clinicians based on home, rather than work, addresses.

Another potential source of error is item response bias. To the extent that nonphysician clinicians are more likely than physicians to value a professional persona that emphasizes care for underserved populations, they might be more likely to overestimate the proportions of Medicaid, uninsured, and minority patients in their practices. Audits of primary care physician practices, however, have indicated that physician reports

Table 4. Results of Regression Models: Odds Ratios of Practicing in Needy Areas, by Type of Area

	Rural Area OR (95% CI)	Vulnerable Population Area OR (95% CI)	HPSA OR (95% CI)
California			
Clinician type			
Family physician	2.24 (1.93-2.60)	1.12 (1.02-1.22)	1.56 (1.41-1.73)
General pediatrician	1.02 (0.85-1.23)	1.22 (1.10-1.34)	1.16 (1.03-1.30)
General internist	0.93 (0.76-1.09)	1.21 (1.11-1.33)	1.09 (0.98-1.21)
Obstetrician-gynecologist	1.0	1.0	1.0
Nurse practitioner	3.17 (2.62-3.84)	1.33 (1.18-1.50)	1.84 (1.61-2.11)
Physician assistant	4.75 (3.80-5.92)	2.18 (1.86-2.56)	2.65 (2.23-3.14)
Race, ethnicity			
Asian	0.60 (0.52-0.70)	1.26 (1.17-1.36)	0.80 (0.73-0.88)
African American	0.30 (0.20-0.45)	2.74 (2.35-3.19)	1.35 (1.14-1.61)
Latino	0.77 (0.63-0.94)	1.90 (1.68-2.14)	1.30 (1.14-1.12)
Other	0.92 (0.69-1.22)	1.17 (0.98-1.39)	0.91 (0.74-1.12)
White	1.0	1.0	1.0
Sex			
Female	0.71 (0.63-0.79)	1.02 (0.96-1.09)	0.90 (0.84-0.97)
Male	1.0	1.0	1.0
Age (10 years)			
Years	2.29 (1.71-3.06)	1.05 (0.88-1.25)	1.29 (1.06-1.57)
Years ²	0.92 (0.89-0.95)	0.99 (0.97-1.01)	0.97 (0.95-0.99)
Washington			
Clinician type			
Family physician	1.85 (1.42-2.42)	0.71 (0.59-0.86)	1.66 (1.35-2.03)
General pediatrician	1.06 (0.75-1.49)	0.66 (0.52-0.84)	1.10 (0.85-1.41)
General internist	1.03 (0.76-1.39)	1.15 (0.92-1.42)	0.92 (0.73-1.15)
Obstetrician-gynecologist	1.0	1.0	1.0
Nurse practitioner	1.79 (1.25-2.57)	1.12 (0.86-1.47)	1.47 (1.11-1.95)
Physician assistant	2.35 (1.70-3.24)	0.90 (0.70-1.16)	1.55 (1.20-2.01)
Race, ethnicity			
Asian	0.39 (0.28-0.55)	1.25 (1.02-1.54)	0.77 (0.62-0.95)
African American	0.30 (0.12-0.74)	2.70 (1.57-4.64)	0.60 (0.35-1.05)
Latino	1.21 (0.80-1.84)	2.01 (1.39-2.92)	1.67 (1.16-2.39)
Other	0.61 (0.45-0.83)	1.93 (1.54-2.40)	0.61 (0.48-0.77)
White	1.0	1.0	1.0
Sex			
Female	0.63 (0.53-0.75)	0.80 (0.70-0.92)	0.71 (0.62-0.82)
Male	1.0	1.0	1.0
Age			
Years	0.72 (0.44-1.20)	0.95 (0.63-1.41)	0.92 (0.61-1.39)
Years ²	1.03 (0.98-1.08)	1.01 (0.97-1.05)	1.00 (0.96-1.04)

HPSA = health professions shortage area, OR = odds ratio, CI = confidence interval.

are a valid representation of the relative number of Medicaid patients in their practice.¹⁷

Finally, our results might not necessarily be generalizable to other states. For example, physician assistant training programs in California and Washington might place a higher value on care of underserved populations than do training programs in other states.

Why do the professional disciplines studied have different proclivities for caring for underserved populations? Among the leading possible explanations are differences in scope of practice, service mission, and practice opportunities. Among the primary care physician specialties, family medicine has the broadest scope of practice, making family physicians especially well suited for the ecological niche of serving rural communities without the critical population density to support a triumvirate of internists, pediatricians, and obstetrician-gynecologists. Nurse practitioner and physician assistant training programs oriented toward family practice also tend to prepare their graduates for the comprehensive scope of practice required in rural settings.

Family medicine and the professions of nurse practitioner, physician assistant, and certified nurse midwife came of age in the 1960s and 1970s. A mission of caring for the underserved was one of the justifications not only for creating these specialties and professions but also for instituting federal grants for training programs in these disciplines. Some leaders of the new specialty of family medicine characterized the specialty as a counterculture movement in medicine, in part because of a belief that family medicine would care for populations that had largely been overlooked by mainstream medicine.^{18,19} Other voices in family medicine cautioned, however, that the specialty might become marginalized by too great an identification with care for disadvantaged populations. In contrast, greater consensus about an emphasis on service to disadvantaged populations existed among leaders in the nurse

practitioner, physician assistant, and certified nurse-midwifery professions as these professions became established in the 1960s and 1970s.^{4,20} Our results support the view that the nonphysician primary care disciplines have to a large degree fulfilled their espoused mission of caring for underserved populations.

A third possible explanation that might particularly apply to the nonphysician clinicians is constrained opportunities to practice in more advantaged settings. During the formative decades of these professions, a mission of service to needy populations dovetailed with restrictive state practice regulations and a dominant physician profession. These factors limited practice in settings that would pose more direct competition to physicians in communities not suffering from shortages of primary care physicians. The relatively high proportion of nonphysician clinicians working in community clinics illustrates the convergence of these multiple possible factors: interest among nonphysician clinicians in serving vulnerable populations, active recruitment of these generalist clinicians by community health centers, and limited practice alternatives. Our data cannot answer the important question of the degree to which the observed patterns of practice locations represent active choice by nonphysician clinicians as opposed to lack of other practice opportunities. It is possible, however, that as state practice regulations and Medicare payment policies for these clinicians continue to be liberalized, nonphysician clinicians might find greater opportunities to practice in settings that are not focused on care of underserved populations.

Our study has several policy implications. First, the primary care disciplines—family medicine, nurse practitioner, physician assistant, and certified nurse-midwife—that have been particularly dependent on funding from federal training grant programs such as Title VII and VIII are also the primary care disciplines with the greatest proportion of their members caring for

Table 5. Practice Settings and Patient Populations of Clinicians in Urban California

	Clinicians Practicing in Community Clinics % (95% CI)	Patients in Clinicians' Practice Who Are		
		Medicaid Beneficiaries Mean % (95% CI)	Uninsured Mean % (95% CI)	Minorities Mean % (95% CI)
Family physicians	3.0 (0.8-5.2)	9.4 (6.8-12.0)	6.2 (4.6-7.9)	49.3 (42.8-55.8)
General pediatricians	4.4 (1.4-7.4)	19.2 (15.0-23.4)	4.8 (3.1-6.5)	58.1 (50.8-65.4)
General internists	3.8 (1.0-6.6)	7.1 (5.0-9.3)	4.2 (2.5-5.8)	47.7 (40.5-55.0)
Obstetrician-gynecologists	0.01 (0.0-0.2)	13.7 (9.8-17.6)	4.4 (3.3-5.4)	53.1 (44.5-61.7)
Nurse practitioners	20.8 (18.9-22.7)	25.5 (24.1-27.0)	24.6 (23.0-26.1)	61.5 (59.2-63.8)
Physician assistants	14.8 (11.8-17.8)	31.0 (28.3-33.8)	17.1 (14.9-19.2)	65.4 (61.4-69.4)
Certified nurse-midwives	17.1 (12.8-21.4)	43.2 (38.7-47.6)	10.7 (8.2-13.2)	66.3 (60.9-71.7)

CI = confidence interval.

P < .001 for overall differences across clinician groups for each item.

underserved populations. Although this association does not prove that these federal grants have directly produced this pattern of service, it does suggest that these training programs in the aggregate have been relatively responsive to the priorities of the federal government for investment in primary care clinician education. It is doubtful that many of these training programs could continue to meet a mission of public service without ongoing support from the federal and state governments.

Second, the continued maldistribution of primary care clinicians suggests that it is appropriate for government to continue to provide incentives to training programs that emphasize production of clinicians for underserved communities. Traditionally, a key incentive has been funding preferences for programs that have a high proportion of graduates working in underserved settings. Our results suggest this funding preference should be continued. Third, policy makers should continue to monitor the geographic distribution and service patterns of primary care clinicians; the dramatic recent changes in the supply of nonphysician clinicians and state practice regulations for these clinicians could affect many of the underlying factors that influence practice location and populations served, potentially resulting in a change with time in patterns of practice location and populations served.

A host of powerful factors, including differences across practice settings in earning potential, lifestyle preferences, clinical infrastructure, and cultural barriers, perpetuate physician maldistribution in the United States.¹ History has shown the fallacy of expecting growth in physician supply to spontaneously ameliorate this maldistribution through a policy of passive diffusion of physicians to underserved communities.⁴ For physicians and nonphysician clinicians alike, achieving a more equitable pattern of service to needy populations will require ongoing, active commitment by policy makers, educational institutions, and the professions to a mission of public service and to implementation of the incentives and support required to promote care to the underserved.

To read commentaries or to post a response to this article, see the online version at <http://www.annfammed.org/cgi/content/full/11/2/97>.

Received October 14, 2002; accepted January 30, 2003.

Key words: Primary Health Care/manpower; Health Personnel; Physicians, Family; Nurse Practitioners; Physician Assistants; Medically Underserved Areas

Financial support

This work was supported by the Bureau of Health Professions, Health Resources and Services Administration (grant 5 U76 MB 10001).

Acknowledgment

The authors acknowledge the assistance of Art Munger in the preparation of this manuscript.

References

1. Council on Graduate Medical Education (COGME). *Tenth Report: Physician Distribution and Health Care Challenges in Rural and Inner-City Areas*. Washington, DC: Government Printing Office; 1998.
2. Institute of Medicine. *Coverage Matters: Insurance and Health Care*. Washington, DC: National Academy Press; 2001.
3. Bindman AB, Huen W, Vranizan K, Yoon J, Grumbach K, Streett L. *Physician Participation in Medi-Cal, 1996 - 1998*. Oakland, Calif: California Medi-Cal Policy Institute; 2002.
4. Politzer RM, Harris DL, Gaston MH, Mullan F. Primary care physician supply and the medically underserved. A status report and recommendations. *JAMA* 1991;266:104-109.
5. Fryer GE, Green LA, Dovey SM, Phillips RI Jr. The United States relies on family physicians unlike any other specialty. *Am Fam Physician* 2001;63:1669-1703.
6. Larson EH, Hart LG, Hummel J. Rural physician assistants: a survey of graduates of MEDEX Northwest. *Public Health Rep* 1994;109:266-274.
7. Scupholme A, DeJoseph J, Strobino DM, Paine LL. Nurse-midwifery care to vulnerable populations. Phase I: demographic characteristics of the national CNM sample. *J Nurse Midwifery* 1992;37:341-348.
8. Moody NB, Smith PL, Glenn LL. Client characteristics and practice patterns of nurse practitioners and physicians. *Nurse Pract* 1999;24:94-96, 99-100, 102-103.
9. Mainous AG, Bertolino JG, Harrell PL. Physician extenders: who is using them? *Fam Med* 1992;24:201-204.
10. Burnett WH, Mark DH, Midtling JE, Zellner BB. Primary care physicians in underserved areas: family physicians dominate. *West J Med* 1995;163:532-536.
11. Morris SB, Smith DB. The distribution of physician extenders. *Med Care* 1977;15:1045-1057.
12. Cooper RA, Henderson T, Dietrich CL. The roles of nonphysician clinicians as autonomous providers of patient care. *JAMA* 1998;280:795-802.
13. Cooper RA, Laud P, Dietrich CL. The current and projected workforce of nonphysician clinicians. *JAMA* 1998;280:788-794.
14. Nurse Practitioners, Physician Assistant & Certified Nurse-Midwives in California. Sacramento, Calif: California Office of Statewide Health Planning and Development; 2000. Available at <ftp://ftp.hrsa.gov/bhpr/nationalcenter/npcnmpaca.pdf>. Accessed April 12, 2002.
15. Komaromy M, Grumbach K, Drake M, et al. The role of black and Hispanic physicians in providing health care for underserved populations. *N Engl J Med* 1996;334:1305-1310.
16. Fernandez A, Grumbach K, Goitein L, Vranizan K, Osmond DH, Bindman AB. Friend or foe? How primary care physicians perceive hospitalists. *Arch Intern Med* 2000;160:2902-2908.
17. Kletke PR, Davidson SM, Perloff JD, Schiff DW, Connelly JP. The extent of physician participation in Medicaid: a comparison of physician estimates and aggregated patient records. *Health Serv Res* 1985;20:503-523.
18. Stephens GG. Family medicine as counterculture. *Fam Med* 1998;30:629-636.
19. Stephens GG. Family practice and social and political change. *Fam Med* 2001;33:248-251.
20. Harper DC, Johnson J. The new generation of nurse practitioners: is more enough? *Health Aff (Millwood)* 1998;17:158-164.