

Shortages of Medical Personnel at Community Health Centers

Implications for Planned Expansion

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RESIDENTS OF THE UNITED States lack universal access to health care, and millions of people have difficulty obtaining medical care.^{1,2} The year 2005 marked the 40th anniversary of one of the nation's most enduring attempts to remedy this problem: the creation of community health centers (CHCs) as part of the "war on poverty."³⁻⁸ The national importance of these centers has grown during the ensuing 4 decades, and the federal government provides funding through a variety of categorical mechanisms under the collective term *federally qualified health centers*. CHCs provide medical, dental, and mental health care for migrant workers, the uninsured, the homeless, and others in need, and the number of people they have served has expanded rapidly in the 21st century.⁹

The role and responsibility of CHCs have increased as more people in the United States have difficulty gaining access to medical care.¹⁰ CHCs now provide care to more than 14 million US residents in more than 3500 communities.⁹ Governed by nonprofit boards with majority representation from the patient population served, CHCs are

For editorial comment see p 1062.

Context The US government is expanding the capacity of community health centers (CHCs) to provide care to underserved populations.

Objective To examine the status of workforce shortages that may limit CHC expansion.

Design and Setting Survey questionnaire of all 846 federally funded US CHCs that directly provide clinical services and are within the 50 states and the District of Columbia, conducted between May and September 2004. Questionnaires were completed by the chief executive officer of each grantee. Information was supplemented by data from the 2003 Bureau of Primary Health Care Uniform Data System and weighted to be nationally representative.

Main Outcome Measures Staffing patterns and vacancies for major clinical disciplines by rural and urban location, use of federal and state recruitment programs, and perceived barriers to recruitment.

Results Overall response rate was 79.3%. Primary care physicians made up 89.4% of physicians working in the CHCs, the majority of whom are family physicians. In rural CHCs, 46% of the direct clinical providers of care were nonphysician clinicians compared with 38.9% in urban CHCs. There were 428 vacant funded full-time equivalents (FTEs) for family physicians and 376 vacant FTEs for registered nurses. There were vacancies for 13.3% of family physician positions, 20.8% of obstetrician/gynecologist positions, and 22.6% of psychiatrist positions. Rural CHCs had a higher proportion of vacancies and longer-term vacancies and reported greater difficulty filling positions compared with urban CHCs. Physician recruitment in CHCs was heavily dependent on National Health Service Corps scholarships, loan repayment programs, and international medical graduates with J-1 visa waivers. Major perceived barriers to recruitment included low salaries and, in rural CHCs, cultural isolation, poor-quality schools and housing, and lack of spousal job opportunities.

Conclusions CHCs face substantial challenges in recruitment of clinical staff, particularly in rural areas. The largest numbers of unfilled positions were for family physicians at a time of declining interest in family medicine among graduating US medical students. The success of the current US national policy to expand CHCs may be challenged by these workforce issues.

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different from the private practices and for-profit entities that deliver most ambulatory care in the United States.¹¹

A national decision to invest further in CHCs has occurred during a period when access to health care in the United States is limited for more people

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than ever before in the country's history.^{10,12,13} Ongoing plans include a 5-year initiative that will increase federal spending on CHCs by at least \$2.2 billion through fiscal year 2006 and substantially increase the number of treated patients.¹⁴⁻¹⁷

We examined the status of the health care workforce in CHCs in the United States, with particular attention to the types of personnel who are most difficult to recruit and retain. Rural health care delivery systems are smaller and less well staffed than their urban counterparts; 20% of the US population lives in rural areas but only 9% of physicians practice there.^{18,19} We therefore also examined whether workforce shortages are more acute in rural CHCs and whether rural and urban CHCs differ in their staffing patterns, the source of their clinicians, and their ability to retain clinicians.

METHODS

The study was undertaken by the Rural Health Research Centers of the University of Washington and the University of South Carolina and the National Association of Community Health Centers (NACHC). A questionnaire was created and pretested with the assistance of an advisory committee composed of representatives from the Office of Rural Health Policy, Bureau of Primary Health Care (BPHC), and Bureau of Health Professions, all components of the Health Resources and Services Administration of the US Public Health Service. For questions about perceived barriers to recruitment, respondents answered on a 4-point scale (1 = not important, 4 = important), and the answers were dichotomized into important or not important. The survey instrument and research methods were reviewed and approved by the Office of Management and Budget and by the institutional review boards of the participating universities.

The study population included the 890 nonprofit organizations that received funding from the federal government's Section 330 Consolidated Health Center Program¹⁵ and reported data to

BPHC's Uniform Data System (UDS) as of 2004. We excluded grantees that did not directly provide general clinical services or were outside of the 50 states and the District of Columbia, leaving a sampling frame of 846 grantees.

The survey instrument was mailed to the chief executive officer of each grantee, with a cover letter from NACHC, on May 7, 2004. A reminder postcard was sent on May 21, and a second mailing and questionnaire with a new cover letter was sent to nonrespondents on June 11. After 2 mailings, all nonrespondents from rural CHCs were surveyed by telephone between September 2 and 17 and asked a subset of the original questions restricted to clinician supply issues. The final response rate was 79.3%, ranging from 85.3% for the largest grantee category (CHCs without other federal funding sources) to 50.9% for the CHCs that received funding solely as homeless centers. Rural grantees' response rate (including the minimal data set obtained by telephone) was 97.5%; urban centers' response rate was 68.5%. Excluding the 2 categories of centers with response rates below 60% did not change the results.

Urban and rural designations are based on the ZIP code version of the Rural-Urban Commuting Area (RUCA) classification system.^{20,21} Because of differential response rates between organizations in urban and rural locations, as well as regional differences, survey results were weighted to make them nationally representative. Weights were tested by being applied to survey responses and comparing the results with UDS variables, including CHC type, size, and patient population. Many CHCs have multiple clinical sites, but each reports data to the federal government only in aggregate. Therefore, the results reported apply to the grantee as a total entity and not individual clinical sites.

The information from the returned questionnaires was coded and data were entered for analysis. The data were checked for systematic errors during routine data cleaning. When response categories for data collected

in the UDS matched survey questions exactly, missing data were imputed from the 2003 UDS. The validity of this imputation was supported by comparison of 2004 survey data and 2003 UDS data for those items in which the response categories were identical, with survey results similar for each category and around 10% higher than UDS, consistent with the 1-year program growth. The source of data on number of patient visits was the 2003 UDS. Means were compared using *t* tests, and proportions were compared using χ^2 tests. All tests were 2 sided, and significance was set at $P < .05$. Data analysis was performed with SPSS statistical software version 11.5 (SPSS Inc, Chicago, Ill).

RESULTS

Location, Structure, and Staffing

The majority of CHCs (62.8%) in the United States are funded as CHCs only (TABLE 1). An additional 114 grantees are funded as homeless centers (13.4%), either as stand-alone entities or in conjunction with CHCs. An additional 93 grantees (11.0%) are either migrant health centers (MHCs) or a combination of CHCs and MHCs. The other 108 health centers represent institutions with other funding combinations.

As a group, US CHCs are in the process of expanding their capability of providing services, with 66.3% of the grantees planning to expand their operations and 54.6% in the process of adding new clinical sites (Table 1). Only 18.1% of the grantees replied that they were planning to do neither.

One of the most important determinants of the structure and function of the CHCs is whether they are located in rural or urban areas. Urban grantees are much more likely to receive their funding from categorical grant programs that grew out of the initial CHC program; 46.5% of urban grantees receive some or all of their funding from the newer funding streams compared with 21.6% of the rural grantees ($P < .001$). Rural CHCs have a mean of 30.9 clinical full-time equivalents (FTEs) compared with the urban CHCs, with a mean of 51.8 FTEs;

Table 1. Structural Characteristics and Expansion Plans of Federally Funded Health Centers, by Grantee Type*

Grantee Type	No. of Clinical Sites per Grantee, Median (Range)	No. (%)			Mean No. in 2003†		Encounters per FTE Physician in 2003‡	No. (%)		
		Grantees	Survey Response Rate		Patients	Visits		Clinical FTEs	Planning to Expand Operations	Planning to Expand Sites
			Rural	Rural						
CHC only	3 (1-21)	531 (62.8)	453 (85.3)	247 (46.5)	11 315	43 792	35.0	3855	379 (73.2)	293 (57.8)
CHC/MHC	5 (1-26)	80 (9.5)	67 (83.8)	44 (55.0)	21 571	86 059	71.4	4158	51 (73.7)	51 (68.4)
Homeless only	7 (1-88)	57 (6.7)	29 (50.9)	1 (1.8)	5512	26 437	13.9	2630	21 (58.2)	16 (45.6)
CHC/homeless	6 (1-27)	57 (6.7)	44 (77.2)	4 (7.0)	18 387	69 553	58.0	3995	46 (79.0)	40 (74.8)
CHC/school health	8 (1-36)	35 (4.1)	21 (60.0)	6 (17.1)	26 546	119 546	95.6	3706	19 (81.4)	19 (79.4)
MHC only	6 (1-19)	13 (1.5)	10 (76.9)	6 (46.2)	5081	16 638	5.1	‡	6 (70.9)	5 (58.5)
All others, with CHC§	11 (1-59)	56 (6.6)	38 (67.9)	6 (10.7)	30 320	119 591	93.9	3955	31 (76.3)	36 (78.8)
All others, without CHC§	2 (1-32)	17 (7.0)	9 (52.9)	1 (5.9)	3654	14 554	10.2	2824	8 (65.3)	2 (13.0)
Overall	4 (1-88)	846 (100.0)	671 (79.3)	315 (37.2)	14 073	55 502	44.0	3882	561 (66.3)	462 (54.6)

Abbreviations: CHC, community health center; FTE, full-time equivalent; MHC, migrant health center.

*Data are from the 2004 survey except as noted.

†2003 Data are from the Bureau of Primary Health Care's Uniform Data System.

‡There were fewer than 10 usable responses in this category.

§"All others" includes other grantees with combinations of funding from migrant, homeless, housing, and school-based programs.

Table 2. Staffing Pattern in US Health Centers, by Rural-Urban Location for Selected Clinical Disciplines, 2004

	FTEs per Grantee, Mean No. [SD] (%)*		P Value
	Rural	Urban	
Physicians			
Family physician/ general practitioner	3.2 [0.21] (59)	3.9 [0.21] (44)	.03
Internist	1.1 [0.10] (20)	2.0 [0.14] (23)	<.001
Pediatrician	0.7 [0.08] (13)	1.9 [0.11] (22)	<.001
Obstetrician/gynecologist	0.3 [0.06] (6)	0.8 [0.07] (9)	<.001
Psychiatrist	0.1 [0.05] (2)	0.2 [0.03] (2)	.10
Subtotal	5.4 (100)	8.8 (100)	
Nonphysician clinicians			
Nurse practitioner	2.4 [0.14] (52)	3.3 [0.15] (59)	<.001
Physician assistant	2.0 [0.18] (43)	1.7 [0.12] (30)	.17
Certified nurse midwife	0.2 [0.03] (4)	0.6 [0.07] (11)	<.001
Subtotal	4.6 (99)	5.6 (100)	
Other clinical staff			
Registered nurse	3.8 [0.21] (48)	5.7 [0.35] (52)	<.001
Mental health professional	2.1 [0.67] (27)	2.2 [0.21] (20)	.82
Dentist	1.2 [0.09] (15)	2.1 [0.11] (19)	<.001
Pharmacist	0.8 [0.11] (10)	1.0 [0.09] (9)	.07
Subtotal	7.9 (100)	11 (100)	

Abbreviation: FTE, full-time equivalent.

*Percentages may not add to 100% because of rounding.

rural centers serve a mean of 9921 patients and have a mean annual budget of \$4 615 639, compared with urban grantees who serve 16 536 patients and spend \$8 488 775 per year.

The main objective of CHCs is the provision of primary care services, and their clinician mix reflects this mission (TABLE 2). Primary care physicians comprise 89.4% of CHC physicians. Family physicians are the single

largest category of specialists in both rural and urban centers, accounting for 48.1% of the total physician staff. Urban grantees employ more internists and pediatricians, but even in these settings the total number of family physicians equals the combined number of internists and pediatricians.

Obstetrician/gynecologists and psychiatrists represent less than 10% of the CHC physician workforce and are more

likely to be found among urban grantees. There are few other specialty physicians; "other specialist physicians" account for only 2.6% of the total number of physicians employed by the CHCs, from the 2003 UDS. Of the grantees, 62.5% of those from rural areas and 28.8% of those from urban areas employ only physicians from the 3 primary care fields.

The physician staff is complemented by a substantial number of primary care nonphysician clinicians, represented by nurse practitioners, physician assistants, and certified nurse midwives. In rural CHCs, 46% of the direct clinical providers of care are nonphysician clinicians compared with 38.9% in urban CHCs. Urban grantees are more likely to employ nurse practitioners. The distribution of nurse midwives is similar to that of obstetricians.

The CHCs have a large complement of registered nurses, with a mean of 3.8 FTEs for rural grantees and a mean of 5.7 FTEs for the urban grantees. Mental health clinicians and dentists are present in most of the CHCs; the number of dentist FTEs in urban areas is almost twice that of their rural counterparts. Pharmacists are commonly found in both settings.

Clinician Vacancies

Funded staff vacancies are common in CHCs (TABLE 3). The greatest aggre-

gate shortages are for family physicians. The average CHC has 13.3% of its family physician FTEs unfilled and is currently recruiting for 0.6 family physicians. Rural CHCs report significantly higher proportions of unfilled positions and more difficulty recruiting family physicians than their urban counterparts, and more than one third of rural grantees have been recruiting for a family physician for 7 or more months. It would require more than 400 FTE family physicians to fill all of the vacancies for this discipline.

As a percentage of vacancies, some of the greatest recruitment difficulties are for obstetrician/gynecologists and psychiatrists, with more than 20% of funded positions unfilled and greater difficulty in recruiting found in rural CHCs. Because there are relatively few funded positions for obstetrician/gynecologists and psychiatrists in CHCs, the average grantee was recruiting for only 0.1 FTE of each of these types of physicians at the survey.

Dentists are also in high demand and short supply. The aggregate demand for dentists is greater than for other non-physicians, and almost half of the rural

grantees have had vacant dentist positions for 7 or more months. By contrast, there is less difficulty reported in recruiting nurse practitioners and physician assistants, without significant rural-urban differences.

Federal and State Recruitment Programs

There are a number of governmental programs used by CHCs to increase the flow of clinicians to underserved areas, which are widely used by rural and urban grantees alike (TABLE 4). These data reflect only clinicians who are currently participating in one of these programs. The number of CHC physicians and dentists who benefited from these programs would be higher if alumni of these programs were included.

There are 3 general categories of recruitment incentives: educational scholarships, in which medical and dental students incur subsequent service paybacks; loan repayment for service in designated shortage areas; and J-1 visa waivers for international medical graduates (IMGs). Of these, loan repayment is the most frequently used. Eight hun-

dred thirty-three (14.5%) of the physicians currently working in CHCs and 348 (22.6%) of the dentists in CHCs were receiving either federal or state loan repayment. Rural programs had a greater proportion of their staff in each of these programs. Of the current rural physician staff, 44.5% are enrolled in one of these programs, almost twice as great a proportion as within urban CHCs.

CHCs in general and rural grantees in particular are dependent on IMG physicians. Of the rural CHCs, 37.6% have current physician staff who have been given J-1 visa waivers that allow them to practice in designated shortage areas. Because some IMGs change their immigration status after several years of working in the United States and no longer depend on J-1 visa waivers to remain in the country, the total number of IMGs working in CHCs is almost certainly higher than that listed in Table 4.

The pattern is similar for dentists, with 32.6% of current rural dentists either previous recipients of National Health Service Corps (NHSC) scholarships or currently receiving loan repayment from

Table 3. Vacancies for Funded Clinician Positions in US Health Centers, by Discipline and Rural/Urban Location, 2004

	Total Vacancies, FTE	Vacancy Proportion				Grantees Reporting That Recruiting Is Very Difficult			Grantees Reporting That Longest Currently Open Position Is Unfilled for ≥7 Months		
		Total, %	Rural, % [SE]	Urban, % [SE]	P Value*	Rural, % [SE]	Urban, % [SE]	P Value	Rural, % [SE]	Urban, % [SE]	P Value
Physicians											
Family physician/general practitioner	427.6	13.3	15.7 [1.20]	12.1 [1.04]	.02	41.8 [3.08]	20.8 [1.96]	<.001	35.6 [4.30]	23.8 [3.14]	.03
Obstetrician/gynecologist	117.1	20.8	26.6 [4.58]	19.0 [2.58]	.15	66.3 [5.19]	49.2 [3.34]	.007	25.1 [6.86]	18.8 [3.89]	.41
Internist	116.6	9.1	8.8 [1.82]	9.2 [1.30]	.86	37.8 [4.25]	12.9 [2.02]	<.001	25.5 [6.89]	14.9 [3.65]	.15
Pediatrician	100.0	8.8	14.1 [2.58]	7.4 [1.17]	.02	46.8 [4.92]	18.7 [2.33]	<.001	22.1 [6.82]	18.9 [4.04]	.75
Psychiatrist	47.6	22.6	25.1 [8.18]	21.5 [3.75]	.68	81.5 [5.24]	52.1 [3.87]	<.001	20.9 [6.68]	18.7 [4.60]	.66
Nonphysician clinicians											
Nurse practitioner	193.4	9.0	8.2 [1.45]	9.4 [1.06]	.56	8.8 [2.11]	11.9 [1.69]	.28	12.9 [4.60]	7.7 [2.49]	.27
Physician assistant	79.8	7.3	6.8 [1.43]	7.6 [1.45]	.71	8.3 [2.32]	9.1 [1.82]	.85	11.4 [4.90]	6.7 [2.71]	.36
Certified nurse midwife	16.8	5.2	8.1 [3.96]	4.6 [1.48]	.41	33.1 [7.01]	12.7 [2.58]	<.001	0	2.8 [2.17]	>.99 (Fisher exact)
Other clinical staff											
Registered nurse	375.9	10.6	9.0 [1.59]	11.1 [1.00]	.22	25.1 [3.23]	48.9 [2.59]	<.001	20.7 [5.27]	24.8 [3.29]	.12
Mental health professional	154.5	12.2	13.6 [3.02]	11.5 [1.40]	.52	42.5 [4.55]	23.8 [2.81]	<.001	23.4 [5.99]	14.8 [3.64]	.17
Dentist	313.0	18.5	26.7 [2.51]	15.4 [1.20]	<.001	62.4 [3.43]	40.7 [2.61]	<.001	47.9 [5.24]	6.7 [3.05]	<.001
Pharmacist	57.1	11.0	16.6 [3.65]	9.0 [1.85]	.07	65.0 [5.74]	53.8 [5.74]	.11	21.3 [7.13]	8.9 [3.71]	.08

Abbreviation: FTE, full-time equivalent.

*Comparing rural vacancy proportion vs urban vacancy proportion.

state or federal government. There is no J-1 visa waiver program for dentists.

Recruitment Barriers and Incentives

We asked respondents to indicate all of the issues that they perceived as preventing recruitment of physicians and nurses. The inability to offer a competitive compensation package was consistently seen as a barrier to recruitment of rural and urban physicians and nurses (FIGURE). The lack of spousal employment opportunities, lack of cultural activities and opportunities, lack of adequate housing, and poor-quality schools were perceived as disproportionately greater barriers for rural centers.

Three potential interventions were selected by the majority of both urban and rural CHCs as tools that would improve recruitment: better capacity to provide annual salary increases, more NHSC loan repayment slots, and greater visibility of CHCs as desirable practice opportunities during training. Urban centers were significantly more likely than their rural counterparts to identify an increase in the number of minority graduates from health professional training programs as a useful strategy (44.6% vs 28.3%, $P < .001$). Other interventions were mentioned by less than one third of respondents.

COMMENT

Our results show that in 2004, CHCs were understaffed and were having difficulty recruiting essential health care personnel. This inability to fill budgeted vacancies could become a rate-limiting factor as they seek to expand their clinical activities to care for needy populations, particularly in rural areas.

The clinical role of CHCs is dependent on primary care clinicians, both physicians and nonphysician clinicians.²²⁻²⁵ This is occurring in a national environment in which primary care in general has lost popularity as a practice discipline. For example, the US production of family physicians has decreased rapidly in the last 7 years, with the number of US medical graduates matching in family medicine declining 51.6% from 1997 to 2005.²⁶ Filling the existing CHC vacancies would absorb 20% of the 2005 output from the family medicine residencies.²⁶ Physician turnover in CHCs is rapid, with a large proportion of physicians leaving after discharging their scholarship obligations or paying off their loans.²⁷ Because family physicians have traditionally been much more likely than other disciplines to provide care to underserved populations,²⁸ the declining production of family physicians may lead

to serious workforce shortages, particularly in rural CHCs.

The high proportion of unfilled positions for obstetrician/gynecologists and psychiatrists also constitutes a problem, even though CHCs employ relatively few of these or other specialists to provide care.^{24,25} Inability to recruit these specialists may impair the ability of CHCs to provide a full spectrum of obstetric and psychiatric services to their clientele.²⁹ Shortages of dentists are also particularly acute, reflecting the national shortage of dental services for the poor and uninsured.^{30,31}

Rural-Urban Differences in Staffing and Workforce Demand

CHCs are a disproportionately important part of the rural health care system.^{32,33} Many rural areas have large vulnerable populations. Poverty, combined with isolation and low population densities, makes it increasingly difficult to provide an appropriate spectrum of health services to these populations.³⁴⁻³⁶ Although only 20% of the population lives in rural counties, 37.2% of CHCs are located in these areas.^{18,19}

Our study indicates that rural CHCs have more difficulty than their urban counterparts in recruiting and retain-

Table 4. Participation in Selected State and Federal Programs Among Physicians and Dentists in US Health Centers, 2004

	Practitioners Currently Using This Program, in FTEs				Grantees Currently Using This Program			
	Rural, No. (%) [SE]*	Urban, No. (%) [SE]*	P Value	Total, No. (%)	Rural, % [SE]	Urban, % [SE]	P Value	Total, %
Physicians								
No.	1540.5			4217.3				
NHSC scholarship	114 (7.4) [0.86]	224 (5.3) [0.72]	.06	338 (5.9)	25.2 [0.02]	22.5 [0.02]	.38	23.5
NHSC loan repayment	210 (13.7) [1.31]	315 (7.5) [0.75]	<.001	525 (9.1)	39.9 [0.03]	32.9 [0.02]	.05	35.6
State loan repayment	101 (6.6) [0.89]	206 (4.9) [0.62]	.12	308 (5.3)	21.2 [0.02]	23.3 [0.02]	.48	22.5
J-1 visa waiver	258 (16.8) [2.15]	277 (6.6) [0.83]	<.001	535 (9.3)	37.6 [0.03]	28.1 [0.02]	.005	31.7
Total	44.5	24.3		29.6				
Dentists								
No.	395.5			1140.0				
NHSC scholarship	21 (5.2) [1.60]	32 (2.8) [0.84]	.18	53 (3.4)	5.4 [0.01]	4.7 [0.01]	.57	5.0
NHSC loan repayment	79 (20.0) [2.59]	161 (14.1) [1.57]	.05	240 (15.6)	22.4 [0.02]	24.7 [0.02]	.51	23.8
State loan repayment	29 (7.4) [1.92]	79 (6.9) [1.08]	.83	108 (7.0)	7.5 [0.02]	11.8 [0.01]	.07	10.2
Total	32.6	23.8		26.0				

Abbreviations: FTE, full-time equivalent; NHSC, National Health Service Corps.

*Rural and urban numbers do not equal total due to rounding. FTEs are rounded to the nearest whole number.

ing an adequate workforce, with rural physician vacancy rates higher for every discipline studied except internists. Rural CHCs face some unique recruitment challenges and often lack the services and amenities that are sought by health professionals, factors that have been shown to be relevant to rural workforce recruitment and retention.^{37,38} One of the most effective ways to attract rural health professionals is to train people from rural backgrounds in programs with a rural emphasis.^{39,40} Unfortunately, declining emphasis on these programs and the decrease in the number of rural students applying from and being accepted to medical schools⁴¹ portend greater difficulties for CHCs and other clinical entities in attracting adequate personnel.⁴²

Limitations

We were unable to receive responses from about 20% of the health centers. However, a response rate of 79.3% for this type of study is high. Moreover, the availability of the 2003 UDS allowed us to impute selected workforce data for centers that did not respond. Information about vacancies is, however, not available in the UDS.

The designation of a grantee as rural or urban was based on the location of the grantee's administrative office, as provided by NACHC. Because most grantees have more than 1 clinical site, some grantees have clinical programs in rural and urban areas. However, 81.9% of the grantees are entirely rural or entirely urban.

The data presented are weighted national estimates, which are designed to compensate for differences in rural and urban response rates, for differences in response across program type, and for geographic variations in reporting. To the extent that differences between respondents and nonrespondents affect their clinical staffing experience, weighted national estimates may not be entirely accurate.

Although the respondents reported that the difficulty in recruiting physicians and nurses has increased some-

what during the last 2 years, this study is cross-sectional, so that we were not able to measure whether vacancies have increased as well. The ongoing expansion of CHCs, coupled with decreasing production of primary care physicians, suggests that workforce shortages may become more important in the years ahead, but future studies should track these changes.

Interpretation of our results is limited by the absence of published benchmarks. Although there appears to be a high proportion of vacancies for selected specialties in this study, there are no data available on what constitutes an expected or acceptable pattern of vacancies for clinicians in ambulatory care settings.

Policy Implications

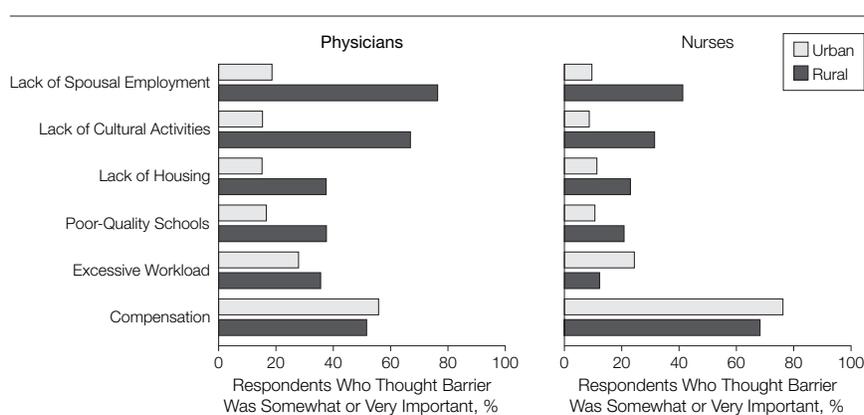
This study suggests that workforce shortages may impede the expansion of the US CHC safety net, particularly in rural areas. During a time when serious shortages of physicians, nurses, and dentists are widespread, CHCs may face increasing competition for these essential personnel.^{31,43,44} The precipitous decline in the proportion of physicians choosing generalist careers may be the rate-limiting step in the nation's ability to staff CHCs and may lead to renewed shortages of safety-net and rural physicians generally.⁴⁵

Recruitment and retention of health care professionals has been a major problem for CHCs since their inception.^{3,46-48} Federal programs such as the NHSC, augmented by state loan repayment and J-1 visa waivers, remain important sources of CHC clinical personnel,⁴⁹⁻⁵³ and our study suggests that they remain important recruitment tools. The chief executive officers of the CHCs identified a number of other interventions that they believe would improve workforce supply, including better salaries, more loan-repayment slots, and greater visibility of CHCs during training. Rural and urban centers had similar responses, even though rural centers are more dependent on federal recruitment programs as a source of physicians and dentists.

These findings suggest several policy options for federal and state government and for the CHCs themselves:

1. Bolster Title VII of the Health Professions Educational Assistance Act. This is the only federal program that exists to encourage the production of primary care clinicians likely to practice in underserved areas and has been successful in improving the supply of primary care practitioners in underserved settings,⁵⁴⁻⁵⁷ but its proposed funding has decreased substantially.⁵⁸

Figure. Perceived Barriers to the Recruitment of Physicians and Registered Nurses, by Location



$P < .001$ for all pairwise comparisons except excessive workload for physicians ($P = .03$), compensation for physicians ($P = .28$), and compensation for nurses ($P = .02$).

2. Augment the use of nurse practitioners and physician assistants as physician substitutes, particularly in urban clinics where the proportional use of physicians is higher.^{25,59}

3. Create new alliances between primary care training programs and CHCs.

4. Expand the NHSC and related state programs that provide financial incentives for health care clinicians who serve in underserved locations.⁶⁰ These programs have more than 30 years of experience in this effort, and the statutory and organizational machinery exists to expand them.⁵³ This expansion would also make health professional education more available to less affluent segments of the US population.

5. Experiment with new approaches to loan repayment to improve retention of physicians who satisfactorily complete their initial contractual obligations, such as a loan repayment program that continued to pay year-to-year retention bonuses.

6. Given the socioeconomic problems that afflict many rural communities, additional incentives may be needed to entice clinicians to rural areas, particularly to communities without the amenities that attract physicians and their families. One approach would be to expand programs, such as the Medicare incentive payment program, which use financial incentives as a magnet.⁶¹

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Study concept and design: Rosenblatt, Curtin, Hart.

Acquisition of data: Rosenblatt, Curtin, Hart.

Analysis and interpretation of data: Rosenblatt, Andrilla, Hart.

Drafting of the manuscript: Rosenblatt, Curtin.

Critical revision of the manuscript for important intellectual content: Rosenblatt, Andrilla, Hart.

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Every man who knows how to read has it in his power to magnify himself, to multiply the ways in which he exists, to make his life full, significant and interesting.

—Aldous Huxley (1894-1963)