
Journal of Urban Health: Bulletin of the New York Academy of Medicine Vol. 78, No. 3, September 2001
© 2001 The New York Academy of Medicine

GENERAL TOPICS

Residents' Preferences and Preparation for Caring for Underserved Populations

Joel S. Weissman, Eric G. Campbell, Manjusha Gokhale, and David Blumenthal

ABSTRACT *Access to care by low-income persons and residents of rural and poor inner-city areas is a persistent problem, yet physicians tend to be maldistributed relative to need. The objectives were to describe preferences of resident physicians to locate in underserved areas and to assess their preparedness to provide service to low-income populations. A national survey was made of residents completing their training in eight specialties at 162 US academic health center hospitals in 1998, with 2,626 residents responding. (Of 4,832 sampled, 813 had invalid addresses or were no longer in the residency program. Among the valid sample of 4,019, the response rate was 65%.) The percentage of residents ranking public hospitals, rural areas, and poor inner-city areas as desirable employment locations and the percentage feeling prepared to provide specified services associated with indigent populations were ascertained. Logistic regressions were used to calculate adjusted percentages, controlling for sex, race/ethnicity, international medical graduate (IMG) status, plans to subspecialize, ownership of hospital, specialty, and exposure to underserved patients during residency. Only one third of residents rated public hospitals as desirable settings, although there were large variations by specialty. Desirability was not associated with having trained in a public hospital or having greater exposure to underserved populations. Only about one quarter of respondents ranked rural (26%) or poor inner-city (25%) areas as desirable. Men (29%, $P < .01$) and noncitizen IMGs (43%, $P < .01$)were more likely than others to prefer rural settings. Residents who were more likely to rate poor inner-city settings as desirable included women (28%, $P = .03$), noncitizen IMGs (35%, $P = .01$), and especially underrepresented minorities (52%, $P < .01$). Whereas about 90% or more of residents felt prepared to treat common clinical conditions, only 67% of residents in four primary care specialties felt prepared to counsel patients about domestic violence or to care for human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) or substance abuse patients (all 67%). Women were more likely than men to feel prepared to counsel patients about domestic violence (70% vs. 63%, $P = .002$) and depression (83% vs. 75%, $P < .01$). Underrepresented minority residents were more likely than other residents to feel prepared to counsel patients about domestic violence ($P < .01$) and compliance with care ($P = .04$). Residents with greater exposure to underserved groups were more prepared to counsel patients about domestic violence ($P = .01$), substance abuse ($P = .01$), and to treat patients with HIV/AIDS ($P = .01$) or with substance abuse problems ($P < .01$). This study demonstrates the need to expose graduate trainees to underserved populations and suggests a contin-*

All authors are from the Department of Medicine, Harvard Medical School, and the Institute for Health Policy at Massachusetts General Hospital and Partners HealthCare System; Drs. Weissman and Blumenthal are from the Department of Health Care Policy, Harvard Medical School.

Correspondence: Joel S. Weissman, PhD, Institute for Health Policy, Massachusetts General Hospital, 50 Staniford Street, Ninth Floor, Boston, MA 02114. (E-mail: jweissman@partners.org)

uing role of minorities, women, and noncitizen physicians in caring for low-income populations.

The shortage of physicians who locate in rural and urban poor communities or who are willing to serve medically indigent patients has persisted in the US despite years of evidence that a physician surplus exists. The physician-to-population ratio in large metropolitan areas is nearly three times that in rural areas.[1] The number of areas with insufficient primary care providers actually increased in the early 1990s.[1] By 1995, there were 24 million persons living in urban centers identified by the federal government as Health Professional Shortage Areas (HPSAs), and nearly two thirds of rural counties were formally designated as HPSAs.[2]

There are many economic, social, and personal factors that discourage physicians from locating in underserved areas or serving low-income populations. Poor city neighborhoods are perceived as having underfunded facilities, high crime, and lack of professional support.[3,4] Rural areas lack the conveniences and cultural stimulation found in large metropolitan areas and lack enough patients to support specialty careers.[5] Low-income populations are more likely to be uninsured or insured by Medicaid, making them less desirable from the perspective of future physician earnings.[4] Although scant studies exist on the topic, physicians may also be dissuaded from locating in poor urban settings because of concerns over multiple secondary psychosocial and substance abuse problems of many of the patients, noncompliance issues, exposure to infectious diseases, and discomfort with minority cultures.[6] Some physicians are more likely than others to treat underserved populations. International medical school graduates (IMGs) tend to pursue specialties and to locate in areas that US medical school graduates (USMGs) avoid,[7–11] often as a way to extend their stay in the US or to build their practices.[12] In particular, IMGs are frequently overrepresented in US counties where infant mortality is high or where the physician-to-population ratio is well below average.[9] Years of research also confirm that underserved patients are more often treated by African American and Latino physicians.[2,13–15] However, the number of African American and Latino physicians is far lower than would be suggested by their presence in the general population.[12]

Although much has been written on the location decisions of physicians, less attention has been given to the preparedness of physicians to care for conditions more often associated with poor and underserved populations. In this study, we assessed residents' reports of their desires to locate in underserved areas or to practice in public hospitals after completion of graduate medical training. We also examined the preparation of physicians to serve low-income populations.

METHODS

Sample

This report is based on findings from the 1998 Commonwealth Fund Survey of Academic Health Center Residents, a national study that examined the career plans, perceived educational quality, and clinical preparedness of residents in eight specialties who were scheduled to complete their training at academic health center (AHC) hospitals by July 1998 (Table 1). The specialties were selected after consultation with representatives from the Association of American Medical Colleges (AAMC)

TABLE 1. Description of study sample

	Number of respondents* (unweighted)	Percentage distribution (unweighted)	Percentage distribution (weighted)
All	2,626	100	100
Sex			
Male	1,567	60	59
Female	1,057	40	41
Race/ethnicity			
White, non-Hispanic	1,847	71	66
Asian	496	19	24
URM	256	10	10
IMG status			
USMG	2,084	80	73
IMG/US citizen	162	6	7
IMG/non-US citizen	373	14	20
Educational debt			
$0	603	25	28
$1–$99,000	1,340	54	52
$100,000+	518	21	20
Specialty			
Internal medicine	279	11	34
Pediatrics	377	14	16
Family practice	326	12	10
OB/GYN	323	12	7
Psychiatry	366	14	9
Anesthesiology	321	12	11
General surgery	307	12	7
Orthopedic surgery	327	12	6
UHC market stage†			
1&2—least competitive	1,002	38	42
3	1,095	42	45
4—most competitive	529	20	13
Subspecialty/fellowship plans			
Yes	1,108	43	44
No	1,484	57	56
Residency location			
Private hospital	1,749	67	67
Public hospital	877	33	33
Exposure to underserved patients			
Low	862	33	32
Medium	840	33	36
High	878	34	32

IMG, international medical graduate; USMG, US medical graduate; OB/GYN, obstetrician/gynecologist; URM, underrepresented minority; UHC, University HealthSystem Consortium.

*The number of valid responses in each category.

†UHC market stage measures the competitiveness of local markets, with stage 4 being the most competitive. Five medical schools were not located in areas included in the UHC market classification tool and were excluded from the original sample.

(Paul Griner, MD, and Roger Meyer, MD, oral communication, February 1998) and included primary care (internal medicine, pediatrics, family practice), surgical specialties (general surgery, orthopedic surgery, obstetrics/gynecology [OB/GYN]), and two specialties that have been especially affected by changes in the health care system (anesthesiology and psychiatry). In many of our analyses, we grouped OB/GYN together with the primary care specialties. We limited our analysis to residents in AHCs because these institutions often are at the forefront of graduate medical education and because we were able to use data from the University HealthSystem Consortium (UHC) to measure the competitiveness of their local markets.

The sample was selected in three steps: (1) Select AHC hospitals; (2) select residency program; (3) select residents. In step 1, using data from the Association of American Medical Colleges (AAMC), we identified 122 AHC hospitals that were under common ownership with a college of medicine or the majority of medical school department chairs served as or appointed the hospital chiefs of service. If no AHC hospital was included in the AAMC list for a medical school, we added hospitals having a major affiliation. If there was more than one hospital with a major affiliation for a given school, we selected the one with the most residents. Finally, we looked at the top 100 training hospitals ranked by number of residents and added any facilities not on our list. Our final AHC sample included 162 hospitals, responsible for training about 40,000 of the nation's 98,000 residents in 1998 (Rebecca Miller, American Medical Association [AMA], oral communication, April 1999).

In the second step of our sampling process, we identified all training programs at these facilities in our eight selected specialties, using the Graduate Medical Education Database of the AMA.[16] The programs were stratified by specialty and market stage,[17] and the size of each program was determined from AMA data. We randomly selected enough programs in each stratum to achieve a desired total sample size of 4,800 subjects (600 in each specialty and 1,600 in each market stage).

In the final sampling step, we selected residents. For most programs, we selected all of the residents. The final sample of residents comprised 4,832 residents in 632 programs.

Survey Design and Administration

The questionnaire was developed using focus groups in each specialty and reviews from expert colleagues. The instrument underwent cognitive testing by the Center for Survey Research at the University of Massachusetts at Boston. Datastat, Incorporated (Ann Arbor, MI) administered the mail survey in the spring of 1998, and Atlantic Marketing Research Company, Incorporated (Boston, MA) performed telephone follow-up interviews. The cover letter stated that the information provided was confidential. We attempted to optimize response rates via advance notification, multiple mailings, multiple telephone attempts, flexible interview scheduling, use of cash prizes, or in some cases, payments for completed interviews. The protocol was approved by the Massachusetts General Hospital institutional review board.

Variables

Dependent Variables We asked each resident to rate the desirability (1 = most desirable to 5 = least desirable) of practicing in a public hospital, rural area, or poor inner-city area after they graduated from their program. We also queried residents about other types of locations and organizational settings, including private

hospitals, group practices, pharmaceutical companies, and others, to anchor the desirability ratings for locations oriented to underserved populations.

Smoking, obesity, human immunodeficiency virus (HIV) infection, domestic violence, substance abuse, depression, and noncompliance have all been shown to be more common among low-income populations.[18–23] Furthermore, low-income persons with one of these conditions are often at higher risk to have another of these problems.[24,25] We asked primary care residents (internal medicine, pediatrics, family practice, obstetrics and gynecology) to rate the extent they felt prepared (1 = very unprepared, 2 = somewhat unprepared, 3 = somewhat prepared, 4 = very prepared) to counsel patients about smoking, diet/exercise, HIV testing, domestic violence, substance abuse problems, depression, and compliance with care issues. Using the same scale, we asked primary care residents how prepared they felt to treat patients with HIV/AIDS (acquired immunodeficiency syndrome) and to treat substance abuse patients because we thought that patients for whom these conditions were a major component of their medical history would present unique clinical challenges and because it is suspected that some physicians may find poor inner-city areas less attractive because of the large numbers of these types of patients likely to be a part of their everyday practice. For comparative purposes, primary care residents also rated preparedness for common types of patients (e.g., chronically ill or critically ill) and for a range of basic, specialty-specific clinical competencies such as diagnosis and treatment of diabetes or hypertension.

Independent Variables Data were collected on socioeconomic and practice characteristics, including sex; race/ethnicity (white non-Hispanic; Asian/Pacific Rim/Indian Subcontinent; black non-Hispanic; Alaskan native/Native American; Hispanic including Mexican, Puerto Rican, Cuban, South American); IMG status (US medical graduate, US citizen/IMG, noncitizen/IMG); educational debt ($0, $1–$99,000, $100,000 or greater); ownership of the AHC where the program was located (public, private); and resident's future plans to subspecialize or enter fellowships (yes/no). To assess exposure to underserved patients during residency, we asked respondents to estimate the percentage of patients they cared for who were African American, Hispanic or Mexican, insured by Medicaid, or uninsured. We summed these percentages and divided the sample of residents into terciles based on the responses, representing high, medium, and low levels of exposure to potentially underserved populations.

As a measure of the competitiveness of the market in which the medical school was located, we classified each hospital into one of four stages, ranging from least (stage 1) to most competitive (stage 4), using a scheme developed by the University HealthSystem Consortium.[17] Market stage has been employed by other studies to measure the effects of competition on the health care system.[26–28] For these analyses, stages 1 and 2 were collapsed. In sensitivity analyses, we reestimated our equations using level of managed-care penetration, and the results were similar.

Analysis

All scaled questions were collapsed to form dichotomous variables (desirable = 1, 2 versus not desirable = 3, 4, 5; prepared = 1, 2 versus unprepared = 3, 4). In separate analyses, we examined the data in the original scaled format, and the results were similar, with somewhat more comparisons achieving statistical significance. Therefore, for ease of presentation, we present only the dichotomous results. Race/ethnic-

ity was collapsed into white non-Hispanic, Asian, and underrepresented minorities (URMs) (all remaining categories).

We estimated 12 separate logistic regressions, including 3 for location desirability and 9 for clinical preparedness. We controlled for sex, race/ethnicity, IMG status, market stage, hospital ownership, specialty, subspecialty/fellowship plans, exposure to underserved patients, and (for preparedness only) desire to locate in an underserved area. The results from the logistic regressions were used to calculate regression-adjusted proportions. Since the unadjusted and adjusted results were similar (i.e., most of the significant differences in the unadjusted proportions retained significance in the adjusted analyses), we present only the adjusted figures. All results were weighted by the inverse of the probability of selection to adjust for variations in sampling rates among the strata and also were weighted to account for nonresponse. Analyses were performed using SUDAAN, a statistical package that is designed for the analysis of data from complex sample surveys and that adjusts the standard errors.[29] Multivariate differences were evaluated using Wald chi-square tests.[30]

RESULTS

Our original sample consisted of 4,832 residents. After excluding 813 invalid cases (incorrect addresses or no longer residents in the program sampled), we had a valid sample of 4,019. A total of 2,626 residents responded, yielding an adjusted response rate of 65.3%, which is comparable with other national surveys of physicians.[31–33] Response rates varied somewhat by specialty and market stage, ranging from 54% for internal medicine to 70% for psychiatry and from 59% in stage 4 markets to 67% in stage 3 markets.

Table 1 lists characteristics of the sample (weighted). About 60% were male, 66% were white/non-Hispanic, and 20% were noncitizen IMGs. Two thirds were in the primary care specialties of internal medicine, pediatrics, family practice, and OB/GYN. Compared with national data on residents, our sample had more whites (57% nationally), but similar proportions of males and IMGs (63% and 26%, respectively, nationally).[34]

One third or fewer respondents rated underserved settings as desirable or very desirable locations for employment after graduation (public hospitals, 33%; rural areas, 26%; poor inner-city areas, 25%; see Table 2). These figures are far lower than the desirability of certain common settings such as teaching hospitals (73%), community hospitals (62%), single-specialty group practices (67%), or medical schools (43%), but are higher than the desirability of staff model health maintenance organizations (HMOs) (10%), solo practice (19%), or pharmaceutical companies (7%) (data not presented).

The preferences for public hospitals were fairly consistent across most residents' characteristics, except for specialty and ownership of hospital. Residents in internal medicine, pediatrics, family practice, and psychiatry had the greatest preferences for public hospitals (40%–45% desirable), and orthopedic surgeons had the least desire to practice there (17%) ($P < .01$). Those who trained in public hospitals were more likely to want to practice there after graduation (39% vs. 31%, $P = .02$). However, exposure to underserved populations was not independently related to the desire to be employed by a public hospital.

Residents' preferences for rural areas varied by subspecialty plans, sex, IMG status, debt, and specialty. Residents with plans to subspecialize or enter fellow-

TABLE 2. Residents' preferences for practice in public hospitals, rural, or poor inner-city areas

	Adjusted percentage* of respondents rating each category as desirable		
	Public hospital	Rural area	Poor, Inner-city area
All	33	26	25
Sex			
Male	32	29	22
Female	35	21	28
P	.47	.00	.03
Race/ethnicity			
White, non-Hispanic	33	26	21
Asian	32	28	27
URM	37	21	52
P	.43	.44	.00
IMG status			
USMG	33	23	23
IMG/US	26	33	28
IMG/Non-US	36	43	35
P	.26	.00	.01
Education debt			
$0	33	21	22
$1,000–$99,000	34	26	25
$100,000+	33	35	29
P	.89	.00	.25
Specialty			
Internal medicine	44	21	29
Pediatrics	43	24	37
Family practice	40	44	41
OB/GYN	31	16	24
Psychiatry	41	31	30
Anesthesiology	29	23	15
General surgery	28	22	26
Orthopedic surgery	17	33	9
P	.00	.00	.00
UHC market stage†			
1&2—least competitive	33	30	20
3	33	23	27
4—most competitive	35	24	32
P	.70	.04	.00
Subspecialty/fellowship plans			
Yes	35	17	28
No	32	34	23
P	.24	.00	.15
Residency location			
Private hospital	31	25	24
Public hospital	39	29	27
P	.02	.17	.37

(*continued*)

TABLE 2. ***Continued***

	Adjusted percentage* of respondents rating each category as desirable		
	Public hospital	Rural area	Poor, Inner-city area
Exposure to underserved patients			
Low	32	23	22
Medium	34	27	26
High	34	28	26
P	.90	.28	.40

IMG, international medical graduate; USMG, US medical graduate; OB/GYN, obstetrician/gynecologist; URM, underrepresented minority; UHC, University HealthSystem Consortium.

*Adjusted percentages control for all of the variables listed in the table. All analyses were weighted; *P*-values for adjusted percentages were based on Wald chi-square tests from logistic regressions.

†University HealthSystem Consortium market stage measures the competitiveness of local markets, with stage 4 being the most competitive. Five medical schools were not located in areas included in the UHC market classification tool and were excluded from the original sample.

ships were much less likely to prefer rural areas (17% vs. 34%, $P < .01$). Residents more likely to rate this location as desirable included men (29% vs. 21% for women, $P < .01$), noncitizen IMGs (43% versus 33% for IMG citizens and 23% for USMGs, $P < .01$), and respondents with large educational debts. Specialty was predictive of location preference, with 44% of family practice residents preferring rural areas versus only 16% of OB/GYN residents ($P < .01$) and with preferences of other specialties falling somewhere between these two.

Residents' preferences for poor inner-city areas varied by sex, IMG status, race/ethnicity, market state, and specialty. Residents more likely to rate poor urban areas as desirable included women (28% vs. 22% for men, $P = .03$), noncitizen IMGs (35% vs. 28% and 23% for citizen/IMG and USMGs, respectively, $P = .01$), URMs (52% vs. 27% and 21% for Asians and whites, respectively, $P < .01$), and residents training in market stage 4 areas (32% vs. 27%, 20% for stages 3 and 1–2, respectively, $P = .004$). Residents in family practice and pediatrics were most likely to find poor urban areas desirable (41% and 37%, respectively), compared with only 15% of anesthesiologists and 9% of orthopedic surgeons ($P < .01$). Having trained in public hospitals or having greater experience caring for underserved populations were not significantly related to the attractiveness of urban areas.

Finally, since caring for underserved populations is often a key component of primary care training programs, we reanalyzed the data in Table 2 after restricting the sample to residents in primary care and OB/GYN. However, the results did not change substantively, so we do not report them here.

With the exception of domestic violence (67%), 80%–94% of primary care residents felt prepared to counsel patients about services related to low income, including smoking, diet/exercise, HIV testing, substance use, depression, and compliance with care (Table 3). Reports of preparedness by female physicians were generally the same as those of males for most areas of counseling, except that

women were more likely to feel prepared to counsel patients about domestic violence (70% vs. 63%, $P = .002$) and depression (83% vs. 75%, $P < .01$). URM residents were more likely to feel prepared to counsel about domestic violence ($P < .01$) and compliance ($P = .04$). Residents with greater exposure to underserved groups were more likely to feel prepared to counsel patients about domestic violence ($P = .01$) and substance abuse ($P = .03$).

Of residents in the four primary care specialties (including OB/GYN), 67% felt prepared to care for HIV/AIDS or substance abuse patients (Table 3). These figures contrasted sharply with residents' self-reported preparedness to care for other types of patients, including those who are chronically ill (89%), critically ill (91%), or terminally ill (86%) (data not shown). Residents with high exposure to underserved patients were significantly more likely than others to feel prepared to care for HIV/AIDS (75%, $P = .01$) and substance abuse patients (73%, $P < .01$), and residents who rated rural or poor urban areas as desirable were more likely to feel prepared to care for substance abuse patients (72%, $P < .01$).

DISCUSSION

The tendency of physicians to locate in relatively well-to-do, cosmopolitan settings, leading to geographic maldistribution and shortages in rural and poor inner-city areas, has been documented since the 1930s.[2] This study adds to the literature by examining the effects of institutional characteristics and experience in caring for underserved patients on residents' desires to locate in underserved areas or to practice in public hospitals at a time in their careers when most physicians are deciding where to set up practice. In addition, this study assesses residents' self-reported preparation to provide services potentially of value to low-income populations. Generally, we found differences in location preferences and in preparedness by sex, IMG status, and physician's race/ethnicity. Respondents with high exposure to vulnerable groups or who completed their residencies in public hospitals were no more likely than others to want to practice in underserved areas, although they felt better prepared on a number of clinical dimensions relevant to low-income populations.

Female residents, noncitizen IMGs, and URMs all expressed significantly greater desire than other residents to practice in poor inner-city settings. The increasing numbers of women seeking medical degrees therefore bodes well for services in the inner city. This trend also could lead to better quality of care in some cases since women are more likely than men to feel prepared to counsel patients about domestic violence and depression.

The differences we found in racial/ethnic preferences for locating in poor inner-city areas are striking. Over 50% of URMs declared such a location to be desirable, compared with less than one quarter of all other residents. The location preferences of residents, although suggestive of future trends, do not predict with certainty that individuals will locate in underserved areas, nor once they do, that they will actually see underserved patients in their practices. However, studies of the composition of physicians in shortage areas usually cannot discern between physicians who locate there out of a desire to serve needy populations versus those who did so because other options in more attractive settings were not available. This study allowed us to learn more about how residents view the *desirability* of underserved settings. It suggests that, even if lucrative suburban practices were available to minority residents, perhaps a significant number might still choose to locate in areas with greater unmet needs. Since the mid-1990s, when the number of URMs enrolling in medical

TABLE 3. Primary care residents'* preparedness for performing services likely to be used by underserved patients

	Adjusted percentage† "very prepared" or "somewhat prepared"								
	Prepared to counsel patients about							Prepared to care for	
	Smoking	Diet and exercise	HIV testing	Compliance with care	Substance abuse	Depression	Domestic violence	HIV patients	Substance abuse patients
All	94	91	93	89	84	80	67	67	67
Sex									
Male	94	90	92	89	86	75	63	66	69
Female	94	92	94	89	83	83	70	68	65
P	.99	.22	.22	.83	.30	.00	.00	.76	.22
Race/ethnicity									
White, non-Hispanic	95	91	93	88	85	82	67	65	70
Asian	94	92	94	86	83	74	60	66	58
URM	94	92	96	94	85	79	75	78	62
P	.53	.82	.13	.04	.80	.06	.00	.08	.05
IMG status									
USMG	93	90	93	89	84	80	66	64	65
IMG/US	96	95	97	92	80	84	74	87	64
IMG/non-US	98	94	93	88	88	81	69	72	75
P	.01	.23	.10	.72	.29	.69	.36	.02	.14
Specialty									
Internal medicine	95	90	94	92	85	82	59	82	79
Pediatrics	91	92	90	88	81	60	58	58	39
Family practice	97	95	93	89	86	90	73	48	71
OB/GYN	91	86	95	86	86	76	75	78	78
P	.00	.01	.04	.18	.21	.00	.00	.00	.00

Education debt									
$0	94	91	92	88	84	77	70	72	65
$1,000–$99,000	95	91	94	90	84	81	65	66	67
$100,000+	95	92	93	88	87	80	68	62	70
P	.86	.89	.62	.80	.30	.30	.38	.45	.54
Residency location									
Private hospital	95	91	93	88	83	79	68	72	68
Public hospital	94	91	94	89	87	81	66	59	64
P	.77	.78	.85	.69	.10	.51	.55	.07	.30
Experience with underserved patients									
Low	93	90	92	87	83	84	68	51	57
Medium	95	92	94	87	81	78	61	65	63
High	95	91	93	90	87	79	70	75	73
P	.51	.76	.25	.37	.01	.17	.01	.01	.00
Preference for practice in underserved areas‡									
Prefer	95	93	94	88	86	82	70	69	72
Do not prefer	94	90	93	90	83	78	65	65	62
P	.28	.13	.79	.54	.07	.09	.07	.24	.00

IMG, international medical graduate; USMG, US medical graduate; OB/GYN, obstetrician/gynecologist; URM, underrepresented minority; UHC, University HealthSystem Consortium.

*These questions were limited to residents in internal medicine, pediatrics, family practice, and obstetrics and gynecology (OB/GYN).

†Adjusted percentages control for all of the variables listed in the table, plus resident's specialty, UHC market stage of hospital, and resident's plans to subspecialize. All analyses are weighted; *P*-values for adjusted percentages are based on Wald-chi square tests from logistic regressions.

‡Refers to respondents who rated either rural or poor inner-city areas as desirable.

schools peaked, there has been a marked drop-off according to the most recent figures available from the AAMC.[35] Our results indicate that reductions in admissions to minority applicants may hamper future efforts to increase services to the urban poor.

Consistent with previous research,[2] the characteristics of physicians preferring rural areas are somewhat different from those preferring the inner city. For example, plans to subspecialize or enter fellowships figured prominently in the desire to locate in rural areas, but this variable was not predictive of underserved urban preferences. Men were more interested than women in rural areas, whereas women were more likely than men to prefer urban settings. Race/ethnicity was not predictive of rural preferences, but was strongly associated with urban settings. Stage 1–2 residents had a slight preference for rural areas, but residents training in stage 4 markets were more likely to prefer poor urban settings. However, these preferences may reflect the fact that stage 4 markets are more likely to be located in highly urbanized settings.

Our findings support the role of IMGs in caring for underserved groups. Noncitizen IMGs were more likely than other residents to be attracted to both rural and poor inner-city areas. Relying on IMGs to provide service in shortage areas is controversial. Most experts in medical workforce issues believe that there are too many doctors in the US, and many have called for reductions, starting with the number of IMGs.[2,36–38] Our results support those who emphasize the usefulness of IMGs, particularly noncitizens, in helping to redress the national imbalance of practitioners.[9] This contrasts, to some extent, with the views of a recent article that called for increases in the class sizes of US medical schools, a move that likely would result in an eventual reduction in the number of IMG residents.[12] The author of the article also stressed the need to enroll more minority applicants and to increase the availability of financial incentives to practice in underserved areas. Our findings certainly confirm the importance of minority physicians in the inner city. However, only future research will shed light on whether offering financial incentives to practicing physicians is a better way to meet the needs of rural areas than encouraging IMGs to come to the US.

Finally, we assessed the preparedness of residents to care for certain types of vulnerable patients or to provide selected services utilized disproportionately by low-income populations. Overall, residents felt relatively less prepared to provide these services than they did for mainstream patients and for common clinical services. However, a desire to practice in underserved areas and greater exposure to disadvantaged patients was related in some cases to higher levels of preparedness. This supports generally the efforts of some medical schools to match the practice preferences of students to the type and range of their clinical training experience. Special programs in social medicine and family practice that target care to low-income groups, such as those at Montefiore Medical Center in New York City or at the San Francisco General Hospital, have had success in channeling graduates to underserved areas.[2] Future research might examine whether those graduates also are more confident in their abilities to care for the needs of low-income patients.

This study has limitations that could affect its generalizability or interpretation. Because the sample was restricted to major AHC teaching hospitals, few were located in rural areas. Therefore, we were unable to test whether residents training in rural settings preferred eventually to practice there. Second, we only asked about the desirability of one type of safety net employer, the public hospital. We might have come to different conclusions had we inquired about the desirability of com-

munity health centers, state mental hospitals, county hospitals, or veterans' facilities. Third, we did not collect data on residents' origins before coming to medical school. Residents growing up in rural communities are more likely to practice there eventually.[39] However, we did measure educational debt, which might be correlated with rural or poor-inner city origins, and therefore perhaps have served as a proxy for this confounder. Indeed, residents with higher debts in our study were more likely to rate rural areas as desirable practice locations. Fourth, we did not ascertain the socioeconomic status of respondents. However, this may not be important since others have shown that minority status is far more predictive of serving vulnerable patients than parental income or education.[14] Finally, resident reports of exposure to vulnerable patient groups may be inaccurate, and self-ratings of preparedness are likely to be related imperfectly to future capability. However, while profiling quality of care generally is difficult to do, other researchers have shown that residents' self-reports are at least as accurate as faculty impressions for purposes of predicting future performance.[40]

Over the years, the federal and state governments have attempted a number of policies to mitigate the maldistribution of medical care, with only limited success. These efforts include general support of medical schools with primary care training as a core mission; scholarship support via the National Health Service Corps (NHSC); the National Loan Repayment Program; support for rural, migrant, and community health centers; and the creation of Area Health Education Centers.[41] In addition, the Medicare program makes Medical Incentive Payments to physicians located in rural shortage areas, and recent changes in the Balanced Budget Amendment of 1997 allow payment of federal graduate medical education monies to health centers. To date, none have completely solved the problem. As long as domestic policies rely on incentives rather than mandates to encourage physicians to locate in underserved areas, understanding the types of physicians who find such settings desirable will be important. While residents continue to prefer to locate in more comfortable settings such as community hospitals and group practices, it is revealing that a substantial portion find public hospitals and rural and poor inner-city areas to be desirable, and that in general they feel prepared to practice there. The challenge is to set policy and to create environments that turn these perceptions into actual commitment. This study demonstrates the continuing need to expose trainees to underserved populations and confirms the role played by minorities, women, and noncitizens in caring for this segment of the US population.

ACKNOWLEDGEMENT

This work was supported by a grant from the Commonwealth Fund, New York City, as part of the activities of the Commonwealth Fund Task Force on Academic Health Centers.

We acknowledge the contributions of Sherry Marcy and staff at Datastat, Incorporated, Peter Hooper, Fenella Prescott, Connor Hughes, and the interviewing staff at Atlantic Market Research Company, Incorporated, for data collection. We thank Brian Clarridge and staff at the UMASS Center for Survey Research for cognitive testing and contributions to the design of the instrument and Tony Roman for statistical consultation. We are indebted to Susan Block for her early help in developing the survey instrument and to Rebecca S. Miller, who was instrumental in helping to provide the sample data and who provided helpful comments on the manuscript.

REFERENCES

1. Rivo ML, Satcher D. Improving access to health care through physician workforce reform. Directions for the 21st century. *JAMA*. 1993;270:1074–1078.
2. Council on Graduate Medical Education. *Tenth Report: Physician Distribution and Health Care Challenges in Rural and Inner-city Areas*. Rockville, MD: US Department of Health and Human Services; February 1998.
3. Li LB, Williams SD, Scammon DL. Practicing with the urban underserved. A qualitative analysis of motivations, incentives, and disincentives. *Arch Fam Med*. 1995;4:124–33; discussion 134.
4. Calman NS. A piece of my mind. No shattered vision. *JAMA*. 1993;269:638.
5. Pathman DE, Konrad TR, Ricketts TC III. The National Health Service Corps experience for rural physicians in the late 1980s. *JAMA*. 1994;272:1341–1348.
6. Komaromy M, Lurie N, Bindman AB. California physicians' willingness to care for the poor. *West J Med*. 1995;162:127–132.
7. Politzer RM, Cultice JM, Meltzer AJ. The geographic distribution of physicians in the US and the contribution of international medical graduates. *Med Care Res Rev*. 1998; 55:116–130.
8. Baer LD, Ricketts TC, Konrad TR, Mick SS. Do international medical graduates reduce rural physician shortages? *Med Care*. 1998;36:1534–1544.
9. Mick SS, Lee SY. The safety-net role of international medical graduates. *Health Aff (Millwood)*. 1997;16:141–150.
10. Mick SS, Lee SY. International and US medical graduates in US cities. *J Urban Health*. 1999;76:481–496.
11. Mick SS, Lee SY, Wodchis WP. Variations in geographical distribution of foreign and domestically trained physicians in the United States: "safety nets" or "surplus exacerbation"? *Soc Sci Med*. 2000;50:185–202.
12. Mullan F. The case for more US medical students. *N Engl J Med*. 2000;343:213–217.
13. Moy E, Bartman BA. Physician race and care of minority and medically indigent patients. *JAMA*. 1995;273:1515–1520.
14. Cantor JC, Miles EL, Baker LC, Barker DC. Physician service to the underserved: implications for affirmative action in medical education. *Inquiry*. 1996;33:167–180.
15. Cohen AB, Cantor JC, Barker DC, Hughes RG. Young physicians and the future of the medical profession. *Health Aff (Millwood)*. 1990;9:138–148.
16. American Medical Association. *Graduate Medical Education Directory 1997–1998*. Chicago, IL: American Medical Association; 1997:1244.
17. University HealthSystem Consortium. *1996 Market Classifications and Revisions of the Market Classification Tool*. Oak Brook, IL: University HealthSystem Consortium; May 1997. UHC Managed Care White Papers, Volume 4, Number 2.
18. Centerwall BS. Race, socioeconomic status, and domestic homicide. *JAMA*. 1995;273: 1755–1758.
19. Gin NE, Rucker L, Frayne S, Cygan R, Hubbell FA. Prevalence of domestic violence among patients in three ambulatory care internal medicine clinics. *J Gen Intern Med*. 1991;6:317–322.
20. Gordillo V, del Amo J, Soriano V, Gonzalez-Lahoz J. Sociodemographic and psychological variables influencing adherence to antiretroviral therapy. *AIDS*. 1999;13:1763–1769.
21. Frazier PA, Davis-Ali SH, Dahl KE. Correlates of noncompliance among renal transplant recipients. *Clin Transplant*. 1994;8:550–557.
22. Miles-Doan R, Kelly S. Geographic concentration of violence between intimate partners. *Public Health Rep*. 1997;112:135–141.
23. US Department of Health and Human Services. *Healthy People 2010*. Washington, DC: US Dept of Health and Human Services; 2000.

24. Johnson EM, Belfer ML. Substance abuse and violence: cause and consequence. *J Health Care Poor Underserved*. 1995;6:113–121; discussion 121–123.
25. Grisso JA, Schwarz DF, Hirschinger N, et al. Violent injuries among women in an urban area. *N Engl J Med*. 1999;341:1899–1905.
26. Weissman JS, Campbell EG, Blumenthal D. How does market competition affect resident physicians' views toward managed care? *Am J Med*. 2000;109(5):437–442.
27. Campbell EG, Weissman JS, Blumenthal D. Relationship between market competition and the activities and attitudes of medical school faculty. *JAMA*. 1997;278:222–226.
28. Weissman JS, Saglam D, Campbell EG, Causino N, Blumenthal D. Market forces and unsponsored research in academic health centers. *JAMA*. 1999;281:1093–1098.
29. Shah BV, Barnwell BG, Bieler GS. *SUDAAN User's Manual*. Release 7.0 ed. Research Triangle Park, NC: Research Triangle Institute; 1996.
30. Hosmer DW, Lemeshow S. *Applied Logistic Regression*. New York: Wiley; 1989.
31. Donelan K, Blendon RJ, Lundberg GD, et al. The new medical marketplace: physicians' views. *Health Affairs*. 1997;16(5):139–148.
32. Tambor ES, Chase GA, Faden RR, Geller G, Hofman KJ, Holtzman NA. Improving response rates through incentive and follow-up: the effect on a survey of physicians' knowledge of genetics. *Am J Public Health*. 1993;83:1599–1603.
33. Miller RS, Dunn MR, Richter TH, Whitcomb ME. Employment-seeking experiences of resident physicians completing training during 1996. *JAMA*. 1998;280:777–783.
34. Dunn MR, Miller RS, Richter TH. Graduate medical education, 1997–1998. *JAMA*. 1998;280:809–812, 836–845.
35. Association of American Medical Colleges. *AAMC DATA BOOK: Statistical Information Related to Medical Schools and Teaching Hospitals*. Washington, DC: Association of American Medical Colleges; 2000.
36. Council on Graduate Medical Education. *First Report of the Council*. Vol 1. Rockville, MD: Bureau of Health Professions, Division of Medicine;. No. HRP-0907210.
37. Institute of Medicine. *The Nation's Physician Workforce: Options for Balancing Supply and Requirements*. Washington, DC: National Academy Press; 1996.
38. Pew Health Professions Commission. *Critical Challenges: Revitalizing the Health Professions for the 21st Century*. San Francisco, CA: University of California at San Francisco Center for the Health Professions; December 1995.
39. Talley RC. Graduate medical education and rural health care. *Acad Med*. 1990;65:S22–S25.
40. Hawkins RE, Sumption KF, Gaglione MM, Holmboe ES. The in-training examination in internal medicine: Resident perceptions and lack of correlation between resident scores and faculty predictions of resident performance. *Am J Med*. 1999;106:206–210.
41. Politzer RM, Harris DL, Gaston MH, Mullan F. Primary care physician supply and the medically underserved. A status report and recommendations [see comments]. *JAMA*. 1991;266:104–109.