Community Residential Segregation and the Local Supply of Federally Qualified Health Centers

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Objective. To examine associations between community residential segregation by income and race/ethnicity, and the supply of federally qualified health centers (FQHCs) in urban areas.

Data Sources and Study Setting. Area Resource File (2000–2007) linked with 2000 U.S. Census on U.S. metropolitan counties ($N = 1,786$).

Study Design. We used logistic and negative binomial regression models with state-level fixed effects to examine how county-level characteristics in 2000 are associated with the presence of FQHCs in 2000, and with the increase in FQHCs from 2000 to 2007. Income and racial/ethnic residential segregation were measured by poverty and the non-white dissimilarity indices, respectively. Covariates included measures of federal criteria for medically underserved areas/populations.

Principal Findings. Counties with a high non-white dissimilarity index and a high percentage of minorities were more likely to have an FQHC in 2000. When we examined the addition of new FQHCs from 2000 to 2007, the effects of both poverty and non-white dissimilarity indices were positive and significant.

Conclusions. Residential segregation likely produces geographic segregation of health services, such that provider maldistribution may explain the association between residential segregation and FQHC supply. Metropolitan areas that fail to achieve greater integration of poor and minority communities may require FQHCs to compensate for provider shortages.

Key Words. Federally qualified health centers, community health centers, safety net, residential segregation, geographic/spatial factors

Federally qualified health centers (FQHCs) are a critical source of primary care for disadvantaged populations with limited access to care, serving nearly one of four low-income Americans (National Association of Community Health Centers 2009). Over 90 percent of health center patients report incomes below 200 percent of the federal poverty level and 75 percent are

either uninsured or covered by Medicaid; 35 percent are Hispanic/Latino, and 27 percent are African American (Taylor 2010).

In largely urban counties, limited access to care has been attributed to not only the uneven geographic distribution of providers but also to the disinclination of providers to care for disadvantaged groups, rather than an overall deficit in physician supply (Fossett and Peterson 1989; Greene, Blustein, and Weitzman 2006). Thus, a community may develop an FQHC to serve its underserved population despite the relative proximity to other providers (Salinsky 2010).¹

That some counties may actually demand FQHCs despite adequate supply suggests that within-county provider imbalances occur (Gaskin et al. 2012). We hypothesize that how segregated a county is by race/ethnicity and income may contribute to the difficulty in fairly distributing its primary care workforce, thus strongly contributing to the interest of counties in developing FQHCs. Understanding the influence of such community stratification factors could inform the policy discussions on allocation of federal resources for community health centers and broaden the policy debate to social reforms that might be requisite in building a more effective primary care safety net.

In this study, we address the impact of one aspect of community social stratification: residential segregation on FQHC supply. Residential segregation has been defined as “the degree to which two or more groups live separately from one another in different parts of the urban environment” (Massey and Denton 1988). Prior research has shown that residential segregation is associated with a number of disparities in access and quality of care, including reduced physician visits, fewer ambulatory surgical facilities, lower supply of general surgeons and colorectal subspecialists, lower odds of receipt of appropriate breast cancer care, and delayed time to renal transplantation (Rodriguez et al. 2007; Haas et al. 2008; Hayanga et al. 2009a, b; Gaskin et al. 2011). Furthermore, studies of residents of integrated communities have shown either elimination or reversal of racial disparities in health and health outcomes (Gaskin et al. 2009; LaVeist et al. 2011).

In the context of FQHCs, residential segregation may contribute to the need for safety net primary care services through multiple mechanisms: (1)

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geographic segregation of health services, with physicians physically distant from low-income and minority populations; (2) increased physician preferences to serve patients of similar race and socioeconomic background; and, as a consequence of (2), (3) lower rates of physician participation in Medicaid in segregated areas (Fossett and Peterson 1989; Greene, Blustein, and Weitzman 2006).

Using national administrative data linked with social indicators, we studied the 8-year period of FQHC expansion from 2000 to 2007 to test our hypothesis that residential segregation by income and residential segregation by race/ethnicity is associated with the local supply of FQHCs.

METHODS

Study Design

We employed a cross-sectional study design to estimate the associations between county sociodemographic characteristics and placement of FQHCs in 2000, and a retrospective cohort design to apply similar analyses to the addition of FQHCs to counties from 2000 and 2007.

Sample and Data Sources

The eligible sample consisted of 1,786 nonrural counties in the United States in 2000, not including those in U.S. territories. Nonrural was defined as located in a core-based statistical area, that is, in metropolitan or micropolitan statistical areas as defined by the Office of Management and Budget. Metropolitan areas contain a core urban area of 50,000 or more population, and micropolitan areas contain an urban core of at least 10,000 (but less than 50,000) population (U.S. Census Bureau 2010). Data on the number of FQHCs and county characteristics were obtained from the Area Resource File 2008, which includes the data years from 2000 and 2007. County data for 2000 were supplemented with Census tract data from the 2000 Census Summary File 3A (Geolytics and the Urban Institute 2007).

Analytic Samples

Of the 1,786 counties eligible for inclusion, 21 counties were excluded from analyses because the entire county was considered as a single Census tract,

thus precluding measurement of within-county residential segregation. For cross-sectional models, Washington, DC was also dropped from analyses due to insufficient within-state variation, yielding an analytic sample size of 1,764 counties in 2000. Counties in Delaware and Hawai'i were likewise dropped for analyses of change from 2000 to 2007, for an analytic sample of 1,757 urban counties.

Measures

In this study, FQHCs consisted of health centers serving underserved populations and areas, as certified by the Centers for Medicaid and Medicare (Office of Workforce Policy and Performance Management, Bureau of Health Professions 2009). For cross-sectional analyses, we used: (1) a binary indicator of whether any FQHCs were located in the county in 2000; and (2) a count of the number of FQHCs in the county, given the county had at least one in 2000. We chose to examine the total number of FQHCs separately for the subset of counties with at least one FQHC (29 percent of metropolitan counties), because we assumed that a minimum threshold effect exists for meeting federal criteria and availability of local resources, and once this minimum has been met, the likelihood of adding more centers increases. For analyses of change from 2000 to 2007, we created (1) a binary indicator for whether the county gained at least one FQHC from 2000 to 2007; and (2) a count of the number of FQHCs added from 2000 to 2007, given at least one was added over this time period.

Residential Segregation. For measures of residential segregation, we used the Dissimilarity Index, which is interpreted as the proportion of minority residents who would have to move, to create an even distribution of minorities across the county. Dissimilarity Indices for non-white versus white, and poor versus nonpoor were constructed from 2000 Census tract and county data (Massey and Denton 1988). White was defined as non-Hispanic white; therefore, non-white included all those populations self-identified as Hispanic, African American, and Other race/ethnicity. Poor was defined as household income less than 100 percent of the federal poverty level. We addressed the effects of poverty residential segregation separately from racial/ethnic segregation, as racial and ethnic minority communities continue to suffer from health care provider shortages, net of area-level income (Komaromy et al. 1996).

Medically Underserved Areas/Populations (MUA/P) Criteria. Approximately, 80 percent of all FQHCs received Section 330 grants from HRSA; to be eligible for these grants, health centers must demonstrate service to a qualified medically underserved area/population (MUA/P) (Salinsky 2010). Therefore, all analyses included the following control measures, for their correspondence to criteria used for assessment of MUA/P: the area-level poverty rate, the number of physicians per 1,000 residents, the percentage of residents older than 65, and the 5-year infant mortality rate (Division of Shortage Designation, Bureau of Health Professions 1995), and the overall population demand for health services using the county total population in 2000. For analyses of growth in FQHCs from 2000 to 2007, we included the baseline number of FQHCs in the county in 2000 in our models. Conceptually, each of the MUA/P criteria variables depicts the policy setting and therefore was included as a control in each of our models, regardless of its significance.

Racial Composition. Racial/ethnic composition is not an MUA/P criterion, but it may confound the estimated effect of racial/ethnic residential segregation on the supply of FQHCs. The percentage of non-white residents, defined as members of all groups other than non-Hispanic white, is related to racial/ethnic residential segregation but could independently contribute to the aggregate area-level demand for safety net services. In our analysis, it is presented in final models if there is evidence of a significant independent effect.

Statistical Analysis

For binary outcomes, we estimated odds ratios (ORs) from multivariate logistic regression models; for count outcomes, we estimated incidence rate ratios (IRR) from multivariate negative binomial regression models. The two residential segregation measures were included alone or jointly in each model, and final models presented were based on model fit. Because unmeasured state-specific factors, such as a state's commitment to developing and expanding safety net services, may bias the model estimates, all models were performed using state-level fixed effects to control for unobserved state-level heterogeneity. In addition, to facilitate interpretation of our findings based on our multivariate models, we further computed predicted probabilities, relative risks (binary outcomes), and risk differences (count outcomes) for high (90th percentile) versus low (10th percentile) values of significant residential segregation predictors and bootstrapped 95% confidence intervals

using the bias-corrected percentile method. Stata 11 was used to perform all analyses.

RESULTS

In 2000, there were a total of 1,620 FQHCs located within 1,786 metropolitan U.S. counties. Slightly over one-third of counties (34.5 percent, $n = 618$) had at least one FQHC; these counties had an average of 2.62 health centers per county. As of 2007, 29.4 percent of counties ($n = 526$) added at least one new FQHC. Counties that gained at least one FQHC experienced an average increase of 2.48 centers per county. The total number of metropolitan FQHCs nationally expanded to 3,071 in 2007.

Counties with at least one FQHC in 2000 had on average, higher percentages of low-income residents (13.43 percent vs. 11.09 percent) and racial and ethnic minorities (27.93 percent vs. 15.53 percent), and higher dissimilarity indices (DI) on both dimensions (poverty DI: 24.81 percent vs. 19.96 percent; non-white DI: 34.73 percent vs. 29.28 percent; $p < .001$) (Table 1). Having at least one FQHC in the county was also associated with a higher average number of physicians *per capita*, higher infant mortality rates, and a lower proportion of elderly in a population.

Counties that gained at least one FQHC from 2000 to 2007 also had on average, higher percentages of low-income residents, members of racial and ethnic minority groups, and higher poverty and non-white dissimilarity indices ($p < .001$ for all) (Table 2).

Federally Qualified Health Centers in 2000

In multivariate regression models, both the county percentage non-white (OR: 1.027; 95% CI: 1.013–1.040) and non-white dissimilarity index (OR 1.022; 95% CI 1.01–1.033) were positively associated with having at least one FQHC in 2000, when controlling for other factors in the model. Both were also positively associated with the total number of FQHCs (%non-white IRR: 1.008; 95% CI: 1.002–1.015; non-white DI IRR: 1.010; 95% CI 1.004–1.016) (Table 3). Of note, county-level physician supply, infant mortality rates, and elderly population were not associated with the odds of having any FQHCs in 2000. The county-level poverty rate and poverty dissimilarity index were not associated with the total number of health centers, when adjusting for all other factors in the model. Employing these models, we further computed the

Table 1: Characteristics of Metropolitan U.S. Counties in 2000, by Presence of Any FQHC

<i>Variable</i>	<i>No FQHC</i> (<i>N</i> = 1,168)	<i>FQHC</i> (<i>N</i> = 618)	<i>Total</i> (<i>N</i> = 1,786)
Residential segregation			
Non-white dissimilarity index [†]	29.28 (11.94)	34.73*** (14.66)	31.18 (13.20)
Poverty dissimilarity index [†]	19.96 (9.90)	24.81*** (11.13)	21.65 (10.60)
MUA/P criteria			
Poverty rate	11.09 (4.49)	13.43*** (5.48)	11.90 (4.98)
Number of physicians per 1,000 residents	1.40 (1.53)	1.90*** (1.65)	1.57 (1.59)
Infant mortality rate	7.15 (2.65)	7.60*** (2.66)	7.30 (2.66)
% over 65 years old	13.31 (3.51)	12.98* (3.35)	13.20 (3.46)
Population in thousands	81.27 (160.27)	273.86*** (585.12)	148.31 (379.74)
Racial composition			
%Non-white [‡]	15.53 (14.47)	27.93*** (21.17)	19.85 (18.09)

Note. Values are expressed as mean (SD).

* $p < .05$; *** $p < .001$.

[†]Dissimilarity index measures residential segregation, and interpreted as the percentage of non-white or poor residents in the county who would have to move to create an even distribution of non-white or poor across the county.

[‡]Non-white includes all groups other than non-Hispanic whites.

FQHC, federally qualified health center; MUA/P, medically underserved area/population.

relative risk (RR) or risk difference (RD) of high (90th percentile) versus low (10th percentile) county characteristics: counties with both a high percentage of minorities and high racial/ethnic dissimilarity index were over three times (RR 3.57; 95% CI: 1.63–7.88) more likely to have any FQHCs, and have on average approximately two additional clinics (RD 1.81; 95% CI 0.61–3.04), compared with those with low indices on both measures (top vs. bottom decile).

Gains in Federally Qualified Health Centers from 2000 to 2007

When we examined the addition of new FQHCs from 2000 to 2007, poverty residential segregation was positively associated with the odds of gaining at least one new FQHC (OR 1.033; 95% CI: 1.017–1.048) (Table 4). The non-white dissimilarity index and the percentage of non-white residents were not significantly associated with the addition of new FQHCs and thus were excluded from Model 3. Among the control MUA/P criteria variables, poverty rate was also associated with higher odds of adding at least one new FQHC, but physician supply, infant mortality rate, and the proportion of elderly in the population were not. On the basis of Model 3, when we

Table 2: Characteristics of Metropolitan U.S. Counties in 2000, by Gain of at Least One FQHC as of 2007

<i>Variable</i>	<i>No New FQHC (N = 1,239)</i>	<i>New FQHC (N = 518)[§]</i>	<i>Total (N = 1,757)</i>
Residential segregation			
Non-white dissimilarity index [†]	29.62 (12.60)	34.87*** (13.92)	31.16 (13.22)
Poverty dissimilarity index [†]	19.91 (10.11)	25.77*** (10.60)	21.64 (10.60)
MUA/P criteria			
Poverty rate	11.58 (4.79)	12.70*** (5.36)	11.91 (4.99)
Number of physicians per 1,000 residents	1.38 (1.54)	2.03*** (1.62)	1.57 (1.59)
Infant mortality rate	7.24 (2.72)	7.45** (2.53)	7.31 (2.66)
% over 65 years old	13.27 (3.51)	13.02** (3.35)	13.20 (3.46)
Population in thousands	83.29 (148.04)	301.98*** (635.76)	147.76 (380.00)
Racial composition			
%Non-white [‡]	17.16 (16.20)	25.84*** (20.30)	19.71 (17.95)

Note. Values are expressed as mean (SD).

** $p < .01$; *** $p < .001$.

[†]Dissimilarity index measures residential segregation, and interpreted as the percentage of non-white or poor residents in the county who would have to move to create an even distribution of non-whites or poor across the county.

[‡]Non-white includes all groups other than non-Hispanic whites.

[§]Although 526 metropolitan counties gained at least one FQHC as of 2007, only 518 remained in the final analytic sample as described in the Methods.

FQHC, federally qualified health center; MUA/P, medically underserved area/population.

computed the relative risk of a high (90th percentile) versus low (10th percentile) poverty dissimilarity index, counties with a high poverty dissimilarity index in 2000 were more likely to add a new FQHC as of 2007, compared with counties with a more even distribution of poor residents (RR 1.87; 95% CI: 1.32–2.54).

Among those counties that added at least one FQHC, both poverty and non-white residential segregation were associated with the number of new health centers gained (IRR: 1.010; 95% CI: 1.000–1.021; and IRR: 1.010; 95% CI: 1.002–1.017, respectively). Poverty rates, physician supply, and existing supply of FQHCs in 2000 were also positively associated with the number of new health centers gained. Using Model 4, we computed the risk difference for high (90th percentile) versus low (10th percentile) residential segregation. Racial/ethnic and income segregation were significant, with an average predicted risk difference of 0.74 additional clinics for counties with high scores on both measures versus those with low indices (95% CI 0.24–1.75).

We then examined the associations between residential segregation and the predicted number of health centers gained for both high and low poverty

Table 3: Multivariate Results: Association of Residential Segregation with Having FQHCs in Metropolitan Counties in 2000

	<i>Model 1 Any FQHC: 2000 (N = 1,764)</i>	<i>Model 2 Number of FQHCs: 2000 (N = 615)</i>
Residential segregation		
Non-white dissimilarity index [†]	1.022*** (1.010–1.033)	1.010** (1.004–1.016)
MUA/P criteria		
Poverty rate	1.129*** (1.080–1.179)	1.003 (0.982–1.025)
Number of physicians per 1,000 residents	1.036 (0.953–1.127)	1.078** (1.032–1.125)
Infant mortality rate	0.989 (0.937–1.045)	1.007 (0.973–1.042)
% over 65 years old	0.986 (0.944–1.029)	0.992 (0.968–1.018)
Population in thousands	1.003*** (1.002–1.004)	1.000*** (1.000–1.001)
Racial composition		
%Non-white [‡]	1.027*** (1.013–1.040)	1.008* (1.002–1.015)

Notes. Values are expressed as Adjusted OR (95% CI). Model 1: Multivariate logistic regression on the presence of any FQHCs. Model 2: Multivariate negative binomial regression on the number of FQHCs, given at least one present in the county. Both models performed with state-level fixed effects.

* $p < .05$; ** $p < .01$; *** $p < .001$.

[†]Dissimilarity index measures residential segregation, and interpreted as the percentage of non-white residents in the county who would have to move to create an even distribution of non-whites across the county.

[‡]Non-white includes all groups other than non-Hispanic whites.

FQHC, federally qualified health center; IRR, incidence rate ratio; MUA/P, medically underserved area/population; OR, odds ratio.

counties (Figure 1). Increasing residential segregation was associated with the addition of multiple new centers even for counties with the bottom decile poverty rate, 6.2 percent. Conversely, the predicted number of new centers for high poverty counties was <2 if either income or racial/ethnic residential segregation was reduced below 20 percent.

Importantly, the association of racial/ethnic segregation persisted across the range of segregation, whereas the relationship for income residential segregation appeared to plateau around 40 percent. In other words, although increased income segregation was associated with adding new FQHCs, there was no marginal gain in supply for FQHCs once nearly half of the poor were segregated from the nonpoor population.

DISCUSSION

Our results indicate that in metropolitan areas, the magnitude of residential segregation is associated with the supply of FQHCs, net of overall poverty

Table 4: Multivariate Results: Association of Residential Segregation with Gaining New FQHCs in Metropolitan Counties from 2000 to 2007

	<i>Model 3 Any New FQHCs: 2007 (N = 1,757)</i>	<i>Model 4 Number of New FQHCs: 2007 (N = 526)</i>
Residential segregation		
Non-white dissimilarity index [†]		1.010** (1.002–1.017)
Poverty dissimilarity index [†]	1.033*** (1.017–1.048)	1.010* (1.000–1.021)
MUA/P criteria		
Poverty rate	1.096*** (1.060–1.133)	1.026** (1.010–1.042)
Number of physicians per 1,000 residents	1.044 (0.960–1.135)	1.051* (1.005–1.098)
Infant mortality rate	1.025 (0.971–1.082)	1.002 (0.968–1.036)
% over 65 years old	0.998 (0.959–1.040)	0.988 (0.963–1.013)
Population in thousands	1.002*** (1.002–1.003)	1.000*** (1.000–1.000)
Number of FQHCs in 2000	1.045 (0.961–1.137)	1.057*** (1.039–1.075)

Notes. Values are expressed as adjusted OR (95% CI). Racial composition was not significant in preliminary models and not included in final models. Model 3: Multivariate logistic regression on the presence of any new FQHCs. Model 4: Multivariate negative binomial regression on the number of new FQHCs, given at least one gained. Both models performed with state-level fixed effects.

* $p < .05$; ** $p < .01$; *** $p < .001$.

[†]Dissimilarity index measures residential segregation, and interpreted as the percentage of non-white or poor residents in the county who would have to move to create an even distribution of non-whites or poor across the county.

FQHC, federally qualified health center; IRR, incidence rate ratio; MUA/P, medically underserved area/population; OR, odds ratio.

rates, and other MUA/P criteria. Poverty segregation was associated with the likelihood of gaining a new FQHC from 2000 to 2007. Racial and ethnic residential segregation was associated with the number of FQHCs at baseline, in 2000, as well as the number gained from 2000 to 2007. Furthermore, we found that high racial/ethnic residential segregation was independently associated with the presence and number of FQHCs, net of the overall population racial/ethnic composition. This implies that even if the minority population is relatively small within a given area, there is a positive relationship to the number of FQHCs if they are highly segregated from the non-Hispanic white population. The associations of area-level race/ethnicity factors appear particularly profound on the likelihood of having at least one FQHC in 2000, given that other indicators, including physician supply and infant mortality, were no longer significant in multivariate analyses.

Our findings are consistent with prior research that has shown that both income and racial residential segregation are negatively associated with urban physician participation in Medicaid (Fossett and Peterson 1989;

Figure 1: Residential Segregation in 2000 and the Gains in Local Supply of FQHCs from 2000 to 2007

Note. The figures plot the effect of residential segregation in 2000 on the number of new federally qualified health centers (FQHCs) gained from 2000 to 2007, for urban counties with high and low poverty rates. Low poverty = 6.2 percent residents with incomes < 100 percent federal poverty level (10th percentile); high poverty = 18.6 percent poor (90th percentile). (a) Income residential segregation; (b) non-white residential segregation.

Greene, Blustein, and Weitzman 2006). Fossett and Peterson proposed that because urban physician offices are more likely to be located in affluent areas, physicians are less likely to serve patients from a mix of socioeconomic backgrounds as a consequence of geographic segregation (Fossett and Peterson 1989). Our findings are also consistent with research that has demonstrated physician shortages at smaller area-level units. Gaskin et al. have shown that ZIP code areas that are majority African American, Hispanic, and have higher percentage of poor residents are also more likely to be areas with primary care physician shortages (Gaskin et al. 2012). When they examined residential segregation at the metropolitan statistical area (MSA) level, they found that majority African American ZIP codes had higher odds of having a shortage of primary care physicians with increasing MSA residential segregation (Gaskin et al. 2012). Thus, in a highly segregated region, the majority of physicians may provide fewer safety net services, and FQHCs may be needed to compensate for provider maldistribution.

We found an escalating effect for racial/ethnic residential segregation in explaining the growth of FQHCs from 2000 to 2007 but found a

plateauing effect for poverty segregation (Figure 1). One explanation of the leveling effect at the upper range of poverty segregation is that extreme levels of segregation are associated with greater overall wealth, such that providers have sufficient well-paying patients to subsidize a segment of their practice in the service of poor patients. This is consistent with a study on access to care by Andersen et al., who found that in metropolitan areas with the greatest income inequality, low-income persons were more, not less, likely to see a physician (Andersen et al. 2002). In contrast, racial/ethnic residential segregation yields a persistent effect. This could be because in the absence of local providers, highly segregated “ethnic enclaves” may spur mobilization and advocacy efforts for development of community health centers for minorities, relative to poor whites.

Greene et al. found that when controlling for area-level race/ethnicity characteristics, the negative association between physician participation in Medicaid and poverty segregation was attenuated and even reversed at levels of segregation higher than 37 percent (Greene, Blustein, and Weitzman 2006). They concluded that because the urban poor are more likely to be non-white, the observed effects of poverty residential segregation are primarily driven by racial/ethnic residential segregation. They argued that, in addition to creating geographic barriers to care, racial residential segregation may reduce provider willingness to care for non-white patients, or to have racially integrated patient panels. Differential provider preferences may explain why, in our study on the supply of FQHCs, the poverty effect appears to plateau, whereas the effect of racial/ethnic segregation does not.

Our focus on social stratification factors associated with the emergence of FQHCs over time builds the evidence base that structural disparities in the health care system may be tied to residential segregation. In the absence of broader social policies that facilitate residential mobility and reduce income inequality, demand for safety net services related to residential segregation may even increase in the near future. Following the economic recession and housing market collapse, income inequality has risen in conjunction with decreased residential mobility, thus setting the stage for greater residential segregation by income (Organisation of Economic Cooperation and Development [OECD] 2011). Preliminary data from the Census 2010 confirm continued growth in the U.S. non-white populations, particularly Hispanic and Asian groups, and although racial/ethnic residential segregation has declined slightly, overall levels remain high (Frey 2011).

Implications for Policy and Practice

Demand for primary care services is expected to rise following health care reform as the uninsured gain coverage, and FQHCs are expected to play a key role in caring for the 16 million Americans who will gain coverage through Medicaid expansion (Milstein, Homer, and Hirsch 2010). The American Reinvestment and Recovery, and the Patient Protection and Affordable Care Acts (ARRA and PPACA) allocated an additional \$13 billion in investments in community health centers (CHCs), but budget negotiations eliminated 60 percent of funds for CHCs for fiscal year 2011, and the guarantees of future funds are increasingly uncertain (Weintraub 2011). This is especially troubling as our study shows that socially stratified communities may be adjusting to provider imbalances through the FQHC mechanism.

Our research highlights the need for greater understanding of the downstream implications of urban development and social welfare policies on health services. Numerous policy options exist for attenuating residential segregation by income, such as regulations and subsidies for mixed-income housing development, or housing vouchers and rental assistance for low-income residents. Policy makers in urban planning and health services should recognize that these types of efforts to reduce inequities in social structure may also reduce the need for compensatory health care safety net services.

However, with the exception of the Fair Housing Act of 1968, few policies explicitly aim to limit racial/ethnic residential segregation, particularly as it remains unclear as to what extent segregation occurs as a result of discriminatory versus self-selection practices (Charles 2004). Instead, the findings of this study suggest that if the effects of minority residential segregation arise from provider preferences, then policies should focus on building a health care workforce committed to providing primary care to underserved communities. Although both ARRA and PPACA authorized funding for primary care training programs and workforce diversity, the relative size and scope of these programs are limited (Association of American Medical Colleges 2010). For example, in 2011, 8.4 percent of U.S. medical school matriculants were Hispanic, whereas Hispanics were 16.3 percent of the U.S. population in 2010 and are projected to be nearly 30 percent of the U.S. population in 2050 (Association of American Medical Colleges 2012; Castillo-Page 2008; Ennis 2011). In the absence of a substantial commitment on the part of health professions education to diversify the workforce, ongoing federal investment in community health centers may be critical to maintain access to primary care for segregated urban minority groups.

Limitations

We used FQHCs as defined by the Centers for Medicare and Medicaid providers database, which does not capture the full spectrum of facilities providing services to disadvantaged populations. For example, we did not include rural health centers, and 382 (21 percent) of counties without an FQHC had at least one RHC in 2000. However, the sample consisted of metropolitan counties, suggesting that the urban centers of these counties still lacked FQHCs. Furthermore, we chose to study this group because these clinics are the primary recipients of recent federal policies to expand safety net services. Also, we measured effects of community context at the county level, which varies considerably both within and across states in terms of size, funding, and policy. We chose to use counties because of their direct relationship to policy and programming, and because community social structure is more readily captured at the level of large geographic areas (Lynch et al. 2004). As a result, we were unable to use control measures of the actual clinic service areas, and although we observed effects of residential segregation, we cannot state definitively that clinics are located in poor and minority neighborhoods. Nevertheless, it seems unlikely that areas with high residential segregation would have increased demand for FQHCs in nonpoor/minority neighborhoods. Thus, our findings reflect the impact of the broader social context, and conclusions are restricted to overall county supply of FQHCs, rather than predictions for specific neighborhoods. Future research is needed to examine more detailed relationships between context and services provided, particularly as community sociodemographic characteristics change over time.

CONCLUSION

Regardless of the ultimate outcomes of PPACA, FQHCs will continue to provide critically needed services for underserved populations. Early evidence from health care reform in Massachusetts shows an increased use of safety net providers, including community health centers, following coverage expansions (Ku et al. 2011). Given that residential segregation is associated with poorer health outcomes and quality of care, FQHCs play a key role in ensuring that health disparities for vulnerable populations are not further compounded by disparities in access to care (Hart et al. 1998; Diez Roux 2003; Chang 2006; White and Borrell 2006; Rodriguez et al. 2007). Finally, the broader social context beyond federal and state authorizing mandates could

contribute considerably to the current distribution of FQHCs across the United States.

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NOTE

1. Health professions shortage area (HPSA) designations are scored using provider to population ratios. Medically underserved area/population (MUA/P) designations are scored upon provider population ratios, poverty rate, infant mortality rate, and elderly population. Applicants may define the size of the service area in need, identify the populations underserved, and local and state officials may additionally confer designations for centers that would otherwise not qualify (Salinsky 2010).

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

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