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Social stratification and the healthcare safety net

A dissertation submitted in partial satisfaction of the requirements for the
degree of Doctor of Philosophy in Health Services

by

Michelle Ko

2012

ABSTRACT OF THE DISSERTATION

Social stratification and the safety net

by

Michelle Ko

Doctor of Philosophy in Health Services

University of California, Los Angeles, 2012

Professor Ninez A. Ponce, Chair

Social inequalities can produce disparities in healthcare access and quality. This dissertation explores relationships between two social stratification processes- community residential segregation and social capital- on the supply of U.S. urban safety net providers.

The first paper, “Community residential segregation and the local supply of Federally Qualified Health Centers,” used data from the Area Resource File and the U.S. Census to examine growth in FQHCs in urban counties from 2000 to 2007. Residential segregation by poverty and race/ethnicity were measured using the dissimilarity index. Logistic and negative binomial regression models were used for dichotomous and count outcomes, respectively. Residential segregation measures were associated with both county FQHC supply at baseline and the addition of new FQHCs over time. Residential segregation may produce geographic segregation of health services, such that FQHCs may be required to fill the gaps arising from provider maldistribution.

The second paper, “Residential segregation and the survival of U.S. urban public hospitals,” used data from the American Hospital Association Annual Survey from 1987 to 2007. Cox proportional hazards models were used to estimate competing risks of hospital closure

versus privatization. Poverty rates, intermediate poverty segregation, a low proportion of black residents, and low black residential segregation were associated with closure. Poverty associations suggest that areas with a high need for safety net services may be at risk to lose them, but segregated black communities may successfully advocate for maintenance of public hospitals. In contrast, Hispanic residential segregation was associated with privatization. Areas with segregated Hispanic communities may be less inclined to support public provision of services and have reduced opposition to privatization.

The third paper analyzed the same sample of urban public hospitals in relation to measures of community social capital. Voting rates were associated with closure, whereas bridging social capital among elites was associated with privatization. The findings suggest that social capital among privileged groups bears more influence on public hospital outcomes than vertical connections between the disadvantaged and those in power.

Taken together, the three papers suggest that social determinants may dictate both the need and societal response for the safety net.

The dissertation of Michelle Ko is approved.

Jack Needleman

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2012

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CHAPTER 1: Introduction

In public health, a strong foundation of research has established the importance of the social determinants of health —and with it, the recognition that social disadvantage can contribute to disparities in health outcomes. A number of factors, such as lower income and educational background, and minority race and ethnicity, have all been associated with poorer health (Braveman, Egerter, & Williams, 2011). In the United States, because of the historical policies that differentially advantaged one group over others, race and income inequalities may be complicit in the production of health inequalities that we see today.

In sociological theory, the system which generates levels of relative social advantage and disadvantage within communities is termed “social stratification,” i.e., “the system of...who gets what, and why” (Kerbo, 1996). The majority of research in health services has tended to focus on the associations between the *indicators* of social disadvantage (the “who” – e.g. racial and ethnic minorities) and healthcare access and quality. A few more recent studies have addressed the “why”- the underlying *processes* of social stratification within a community that produce differential access to healthcare (Braveman et al., 2011). For example, it has been well established that in the U.S., black patient populations experience barriers in access to timely quality care. More recent literature argues that these disparities may arise from the community social context- that black residents tend to live in black communities, which may be relatively isolated and lack quality healthcare providers (Darrell J. Gaskin, Dinwiddie, Chan, & McCleary, 2011). Such isolation may be physical: residential segregation of black patients in black communities results in geographic distance from providers. Isolation may also be social: black communities may lack the social capital, i.e. the social networks and relationships, that facilitate access to higher quality providers. This dissertation examines these two aspects of social

stratification processes, residential segregation and social capital, in relation to the healthcare safety net. Because safety net providers have a mission to address gaps in access to care, presumably generated by structural inequalities, it would be of interest to researchers and policymakers alike as to whether social stratification processes have independent effects on safety net providers. In other words, are structural disadvantages replicated in the delivery of safety net services?

Residential segregation and health services

Residential segregation refers to “the degree to which two or more groups live separately from one another in different parts of the urban environment” (Massey and Denton 1988). Isolation of disadvantaged groups into concentrated neighborhoods is associated with poorer education systems, employment opportunities, access to transportation, and public safety (Wilson, 1987). Similarly, segregated low-income and minority communities may experience greater difficulty in attracting healthcare providers, and have fewer neighborhood resources such as nonprofit and governmental organizations that promote health and access care (White, Haas, & Williams, 2012). Prior research has shown that residential segregation is associated with fewer physician visits, higher odds of primary care physician shortage, 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 (D. J. Gaskin, Dinwiddie, Chan, & McCleary, 2012; Darrell J. Gaskin, Price, Brandon, & LaVeist, 2009; Haas, Earle, Orav, Brawarsky, Keohane, Neville et al., 2008; Awori Jeremiah Hayanga, Kaiser, Sinha, Berenholtz, Makary, & Chang, 2009; Awori J. Hayanga, Waljee, Kaiser, Chang, & Morris, 2009; Rodriguez, Sen, Metha, Moody-Ayers, Bacchetti, & O'Hare, 2007). Safety net providers have the potential to fill the gaps in the healthcare delivery system related to residential segregation.

Alternatively, safety net providers that serve highly segregated communities may disproportionately experience reductions in financing, leading to lower quality of care and facility closures (White et al., 2012). No studies have examined the extent to which, if any, residential segregation is associated with the supply of safety net providers.

Social capital and health services

Whereas residential segregation has been thought to contribute to disparities in access to care, researchers have focused on community social capital as a means by which disadvantaged populations may transcend structural barriers to care. Community social capital: “all features of social life- networks, norms, and trust- that enable participants to act together more effectively to pursue shared objectives” may improve access to care via multiple pathways. First, social networks may facilitate connections between communities and healthcare providers. Second, social capital may promote increased provider responsiveness to community needs. Lastly, community social capital may also promote general interest in the collective well-being of its members, including disadvantaged populations. (Putnam, 2000; Sampson, 2003). However, the evidence for the effects of community social capital in health services has been mixed. Some studies have shown that community-level social capital was associated with fewer reported problems in access to care, greater odds of having a regular source of care, and increased use of mental health services (Drukker, Driessen, Krabbendam, & van Os, 2004; Greenberg & Rosenheck, 2003; Hendryx, Ahern, Lovrich, & McCurdy, 2002; Lee, Chen, & Weiner, 2004; Prentice, 2006). Other studies have found that community social capital is associated with fewer visits to a general practitioner and a higher number of preventable hospitalizations (Derose, 2008; Laporte, Nauenberg, & Shen, 2008). Almost no studies have addressed relationships

between community social capital and healthcare systems. Social capital was found to have mixed associations with provision of community services on the part of private hospitals (Lee et al., 2004). Disadvantaged communities with greater social capital may have increased access to care via traditional healthcare providers, thus reducing the need for safety net services. Alternatively, communities with greater social capital may have improved connections to policymakers and funding agencies to support the healthcare safety net.

Social stratification and the safety net

Only a limited body of research has explored the intersection between community context and the healthcare safety net. In 2004, Marquis et al found that local safety net resources are associated with both higher community income per capita and percentage of black residents (Marquis, Rogowski, & Escarce, 2004). The findings regarding black populations suggest that on the one hand, safety net providers are countering race-based community inequities in access to care. On the other hand, the positive association between income and safety net resources suggests that higher socioeconomic (SES) areas also have greater capacity to support safety net services, even though poor SES communities are more likely to require these services. However, this study highlights associations between *indicators* of social disadvantage and advantage and the safety net. No prior studies have examined relationships between social stratification *processes* and safety net supply.

In the following three papers, this dissertation explores relationships between community residential segregation and social capital on changes in the supply of U.S. urban Federally Qualified Health Centers (FQHCs) and public hospitals. Each paper proposes mechanisms by which these dimensions of social stratification may affect safety net providers and tests corresponding hypotheses by examining how each measure relates to the change in provider

supply over time. The studies take place during a period of gradual decline in the supply of public hospitals, either through closure or privatization, and a rapid rise in the number of FQHCs.

The first paper, titled, “Community residential segregation and the local supply of Federally Qualified Health Centers,” addresses the relationships between community residential segregation by income and race/ethnicity, and growth in FQHCs in metropolitan U.S. counties. Data from the Area Resource File are linked with U.S. Census data 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 are measured by poverty and the non-White dissimilarity indices, respectively, and covariates included measures of federal criteria for medically underserved areas. Multivariate logistic and negative binomial regressions are performed to estimate effects on binary and count outcomes, respectively. This study proposes that how segregated a county is by race/ethnicity and income may contribute to the difficulty in fairly distributing their primary care workforce, thus strongly contributing to the interest of counties in developing FQHCs.

The second paper, “Residential segregation and the survival of U.S. urban public hospitals,” explores the effects of similar predictors on a second set of outcomes, urban public hospital closures and privatizations. Data from the American Hospital Association Annual Survey and Medicare Cost Reports are linked with U.S. census data to estimate the effects of community sociodemographics and residential segregation on hospital status changes from 1987 to 2007, controlling for hospital, healthcare market, and policy contextual characteristics. Residential segregation is again measured by poverty and racial/ethnic dissimilarity indices. Cox proportional hazards models are performed to estimate competing risks of closure and

privatization. This study proposes that residential segregation will be associated with a lower likelihood of loss of public hospital services over time. Public hospitals in segregated areas may be less likely to close as a result of increased utilization of services, decreased market competition from private providers, and greater political support from both community and private sector interests. These hospitals may also be less likely to privatize due to the lack of private entities willing to assume the responsibility of safety net services for a segregated community.

The third paper addresses community social capital in relation to safety net providers using the same sample of urban public hospitals from the second paper. Two sources are used to create social capital constructs: 1) data on voluntary organizations, derived from the 2009 County Business Patterns database; and 2) data on voting patterns from the 2010 USA Counties database. Factor analysis was performed to create two social capital scales corresponding to bridging (horizontal ties across heterogeneous social groups) and linking (vertical ties across power or authority gradients) social capital. This study proposes that public hospitals located in communities with greater bridging and linking social capital are less likely to close, but may be more likely to convert to private ownership. Social capital may heighten community interest in the well-being of disadvantaged populations, thus reducing the motivation for closure. Furthermore, social capital may foster private sector willingness to provide safety net services, and improve collaborations with community stakeholders, thus fostering the transfer of healthcare responsibilities to a privately-owned entity.

Together, the three papers of this dissertation aim to provide insight on the relationships between social context and health services. The findings will contribute to the existing knowledge on the pathways between social determinants and access to care. Furthermore,

although the dissertation is focused on safety net providers, it sheds light on the overall US health care system's provision of healthcare to vulnerable populations. If the safety net infrastructure is more robust in areas with greater structural inequalities (increased residential segregation, lower social capital), this suggests that safety net providers are appropriately responding to healthcare disparities related to segregation. However, this also implies that without broader changes in health or social policy, segregation processes may perpetuate the need for safety net providers to compensate for gaps in care. If, instead, the supply of safety net providers is higher in less stratified areas (decreased residential segregation, higher social capital), this suggests that the same social stratification processes that produce inequities in traditional healthcare also lead to shortfalls in the safety net.

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CHAPTER 2: Community residential segregation and the local supply of Federally Qualified Health Centers

Abstract

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=1786).

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.

Introduction

Federally Qualified Health Centers (FQHCs) are a critical source of primary care for disadvantaged populations with limited access to care, serving nearly 1 out of 4 low-income Americans (National Association of Community Health Centers 2009). Over 90% of health center patients report incomes below 200% of the Federal Poverty Level and 75% are either uninsured or covered by Medicaid; 35% are Hispanic/Latino, and 27% 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).ⁱ

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 their 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 (Gaskin et al. 2011; Haas et al. 2008; Hayanga et al. 2009a; Hayanga et al. 2009b; Rodriguez et al. 2007). 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) 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 et al. 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 Federally Qualified Health Centers (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 1786 non-rural counties in the United States in 2000, not including those in U.S. territories. Non-rural was defined as located in a Core Based Statistical Area, i.e. 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 was supplemented with Census tract data from the 2000 Census Summary File 3A (Geolytics and the Urban Institute 2007).

Analytic Samples

Of the 1786 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, D.C. was also dropped from analyses due to insufficient within-state variation, yielding an analytic sample size of 1764 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 1757 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 or not 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% 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 or not 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, in order to create an even distribution of minorities across the county. Dissimilarity Indices for non-White versus White, and poor versus non-poor 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% 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 healthcare provider shortages, net of area-level income (Komaromy et al. 1996).

Medically Underserved Areas/Populations (MUA/P) Criteria

Approximately 80% of all FQHCs received Section 330 grants from HRSA; in order to be eligible for these grants, health centers must demonstrate service to a qualified Medically Underserved Areas/Populations (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 1000 residents, the percentage of residents over the age of 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 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 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 1620 Federally Qualified Health Centers located within 1786 metropolitan U.S. counties. Slightly over one third of counties (34.5%, n=618) had at least one FQHC; these counties had an average of 2.62 health centers per county. As of 2007, 29.4% 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 3071 in 2007.

Counties with at least one FQHC in 2000 had on average, higher percentages of low-income residents (13.43% vs. 11.09%) and racial and ethnic minorities (27.93% vs. 15.53%), and higher dissimilarity indices (DI) on both dimensions (poverty DI: 24.81% vs. 19.96%; non-White DI: 34.73% vs. 29.28%; p<0.001) (Table 2.1.a). 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 ($p < 0.001$ for all) (Table 2.1.b).

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 2.2). 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 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 3 times (RR 3.57; 95% CI: 1.63-7.88) more likely to have any FQHCs, and have on average approximately 2 additional clinics (RD 1.81; 95% CI 0.61-3.04), compared to those with low indices on both measures (top versus bottom decile).

Gains in Federally Qualified Health Centers from 2000 to 2007

When we examined the addition of new Federally Qualified Health Centers 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 2.3). 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. Based on Model 3, when we 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 to 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 counties (Figure 2.1). Increasing

residential segregation was associated with the addition of multiple new centers even for counties with the bottom decile poverty rate, 6.2%. Conversely, the predicted number of new centers for high poverty counties was less than 2 if either income or racial/ethnic residential segregation was reduced below 20%.

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%. 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 non-poor 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 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; Greene et al. 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 for 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% (Greene et al. 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 healthcare 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 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 remains 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% of funds for CHCs for fiscal year 2011, and the guarantees of future funds are increasingly uncertain (Weintraub 2011). This is especially troubling since 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. Policymakers 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 healthcare 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 healthcare 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% of U.S. medical school matriculants were Hispanic, whereas Hispanics were 16.3% of the US population in 2010 and are projected to be nearly 30% of the US population in 2050 (Association of American Medical Colleges 2012; Castillo-Page 2008; U.S. Census Bureau 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 Federally Qualified Health Centers 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%) 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 Federally Qualified Health Centers. 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 Federally Qualified Health Centers in non-poor/minority neighborhoods. Thus our findings reflect the impact of the broader social context, and conclusions are restricted to overall county supply of Federally Qualified Health Centers, 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, Federally Qualified Health Centers will continue to provide critically needed services for underserved populations. Early evidence from healthcare 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 (Chang 2006; Diez Roux 2003; Hart et al. 1998; Rodriguez et al. 2007; White and Borrell 2006). Finally, the broader social context beyond federal and state authorizing mandates could contribute considerably to the current distribution of FQHCs across the United States.

Endnotes

1. Health Professions Shortage Area (HPSA) designations are scored using provider to population ratios. Medically Underserved Areas/Populations (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).

Table 2.1.a. Characteristics of metropolitan U.S. counties in 2000, by presence of any FQHC.

Variable	No FQHC (N=1168)		FQHC (N=618)		Total (N=1786)	
	mean	(SD)	mean	(SD)	mean	(SD)
<i>Residential Segregation</i>						
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)
<i>MUA/P Criteria</i>						
Poverty rate	11.09	(4.49)	13.43***	(5.48)	11.90	(4.98)
Number of physicians per 1000 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)
<i>Racial Composition</i>						
%Non-White ^{††}	15.53	(14.47)	27.93***	(21.17)	19.85	(18.09)

*p<0.05; **p<0.01;***p<0.001

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

^{††}Non-White includes all groups other than non-Hispanic Whites

SD: standard deviation

Medically Underserved Areas/Populations (MUA/P)

FQHC: Federally Qualified Health Center

Table 2.1.b. Characteristics of metropolitan U.S. counties in 2000, by gain of at least one FQHC as of 2007

Variable	No New FQHC (N=1239)		New FQHC (N=518) ^{†††}		Total (N=1757)	
	mean	(SD)	mean	(SD)	mean	(SD)
<i>Residential Segregation</i>						
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)
<i>MUA/P Criteria</i>						
Poverty rate	11.58	(4.79)	12.70***	(5.36)	11.91	(4.99)
Number of physicians per 1000 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)
<i>Racial Composition</i>						
%Non-White ^{††}	17.16	(16.20)	25.84***	(20.30)	19.71	(17.95)

*p<0.05; **p<0.01;***p<0.001

[†]Dissimilarity index measures residential segregation, and interpreted as the percentage of non-White or poor residents in the county who would have to move in order 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.

MUA/P: Medically Underserved Areas/Populations

FQHC: Federally Qualified Health Center

Table 2.2. Multivariate results: Association of residential segregation with having FQHCs in metropolitan counties in 2000

	Model 1 Any FQHC: 2000 (N=1764)		Model 2 Number of FQHCs: 2000 (N=615)	
	Adjusted OR	95% CI	Adjusted IRR	95% CI
<i>Residential Segregation</i>				
Non-White Dissimilarity Index [†]	1.022***	(1.010- 1.033)	1.010**	(1.004- 1.016)
<i>MUA/P Criteria</i>				
Poverty rate	1.129***	(1.080- 1.179)	1.003	(0.982- 1.025)
Number of physicians per 1000 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)
<i>Racial Composition</i>				
%Non-White ^{††}	1.027***	(1.013- 1.040)	1.008*	(1.002- 1.015)

*p<0.05; **p<0.01; ***p<0.001

OR: Odds Ratio; IRR: Incidence Rate Ratio

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

^{††}Non-White includes all groups other than non-Hispanic Whites

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.

MUA/P: Medically Underserved Areas/Populations

FQHC: Federally Qualified Health Center

Table 2.3. Multivariate results: Association of residential segregation with gaining new FQHCs in metropolitan counties from 2000 to 2007

	Model 3 Any new FQHC: 2007 (N=1757)		Model 4 Number of new FQHCs: 2007 (N=526)	
	Adjusted OR	95% CI	Adjusted IRR	95% CI
<i>Residential Segregation</i>				
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)
<i>MUA/P Criteria</i>				
Poverty Rate	1.096***	(1.060- 1.133)	1.026**	(1.010- 1.042)
Number of physicians per 1000 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)

*p<0.05; **p<0.01; ***p<0.001

OR: Odds Ratio; IRR: Incidence Rate Ratio

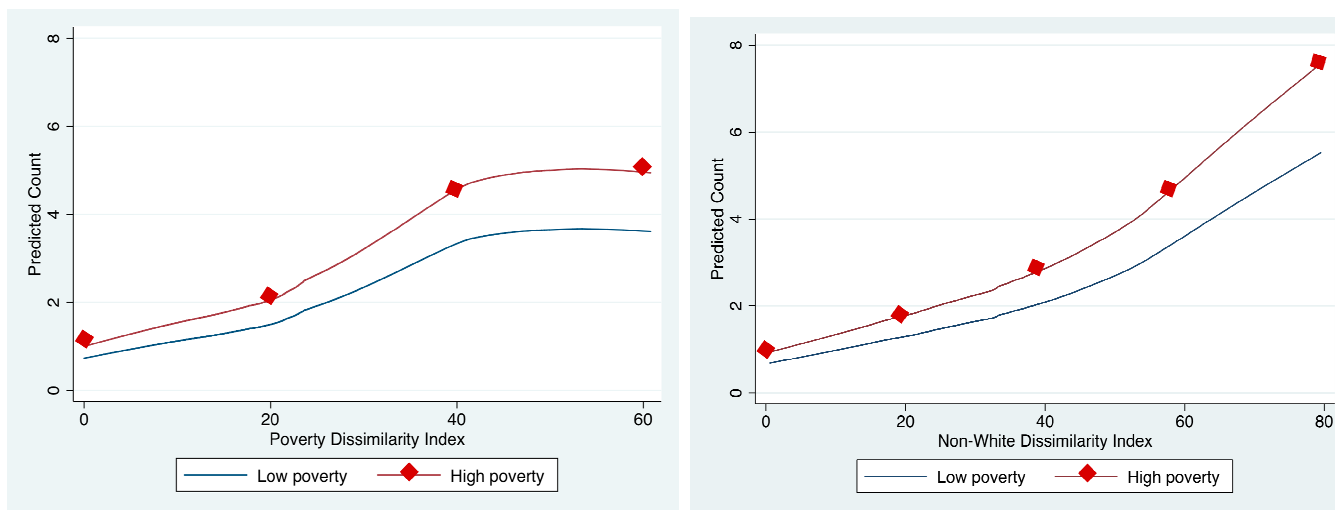
[†]Dissimilarity index measures residential segregation, and interpreted as the percentage of non-White or poor residents in the county who would have to move in order to create an even distribution of non-Whites or poor across the county.

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.

Figure 2.1. Residential segregation in 2000 and the gains in local supply of FQHCs from 2000-2007



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% residents with incomes<100% Federal Poverty Level (10th percentile); High poverty=18.6% poor (90th percentile). (a) Income residential segregation (b) non-White residential segregation.

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CHAPTER 3: Residential segregation and the survival of U.S. urban public hospitals

Abstract

Loss of urban public hospital services can threaten access to care for disadvantaged populations, including the poor, uninsured, and racial and ethnic minorities. Using a national sample of U.S. metropolitan public hospitals, we examined the effects of community sociodemographics and residential segregation on closures and privatizations from 1987 to 2007, controlling for hospital, healthcare market, and policy contextual characteristics. We found that hospitals in areas with high poverty rates and intermediate poverty segregation are more likely to close, whereas hospitals in communities with a large black population and racial residential segregation were less likely to close. Public hospitals in areas with higher levels of Hispanic residential segregation were more likely to close. Policies aimed at improving access to care for vulnerable populations should consider the effects of community contextual factors, such as residential segregation, on the stability of the healthcare safety net.

Introduction

In the past several decades, public hospitals have faced mounting financial and political pressures to survive in an increasingly cost-driven health care market. The number of uninsured individuals has continued to rise, while shrinking third party payments have limited private hospitals' willingness to provide charity care, thus increasing the burden on the public sector (Weissman et al. 2003; Cunningham and May 2006; Brennan, Guterman, and Zuckerman 2001). At the same time, private providers have drawn away "healthy" Medicaid populations, a major

source of paying patients for public hospitals (Gaskin, Hadley, and Freeman 2001). Furthermore, federal and state policy changes, including Medicaid managed care programs and cuts in disproportionate share hospital (DSH) and indirect medical education payments (IME) have periodically reduced funds available to public hospitals (Heiber-White 1997; Regenstein and Huang 2005). In this changing fiscal and policy environment, hospitals owned by public entities have been privatized or closed, at rates exceeding those of privately-owned hospitals (Needleman and Ko In press).

Loss of urban public hospital services through either closures or privatizations can threaten access to care for the most vulnerable populations: the poor, the uninsured, Medicaid recipients, and racial/ethnic minorities (Gage et al. 1998; Regenstein and Huang 2005). In major U.S. metropolitan areas, public hospitals also account for over 23% of emergency visits, and provide 63% of burn and 40% of trauma care (Study reveals NAPH members are 'Providers of Choice' for all patients 2011). Following safety net hospital closure, local patient populations have experienced poorer overall health, delays in obtaining needed care, reduced access to specialty care, and increased travel distances (Bindman, Keane, and Lurie 1990; Bovbjerg 2000; Walker, Clarke et al. 2011; Walker, Leng et al. 2011; Bazzoli et al. 2012). Case studies of non-profit conversions report no initial changes in access to care, but empirical studies of conversions from public to for-profit status have found subsequent declines in hospital uncompensated care and closure of trauma centers (Thorpe, Florence, and Seiber 2000; Shen 2003; Desai, C, and Young 2000; Legnini et al. 1999; Needleman 1999).

A body of literature has examined closures and ownership conversions for hospitals broadly (i.e., predominantly private, not for profit institutions), but there is a paucity of research concerning these outcomes for public hospitals. Prior research has shown that hospital closure is

associated with: smaller size, fewer high technology services, higher share of revenues paid by Medicare and Medicaid, non-teaching status, lower utilization, higher operational inefficiency, increased market competition and higher population density in the hospital's area (Deily, McKay, and Dorner 2000; Ciliberto and Lindrooth 2007; Harrison 2007; Lindrooth, Lo Sasso, and Bazzoli 2003). Factors correlated with ownership conversions are similar, although Harrison found that size and occupancy rate were not related and that higher share of Medicare revenues was associated with a lower rate of conversion (Harrison 2007; Mark 1999). In each study, the authors either excluded public hospitals from their models or added public ownership as a control variable. The existing literature has acknowledged the "soft budget constraints" faced by public hospitals, allowing these institutions to maintain services under unfavorable market and financial conditions (Duggan 2000; Eggleston and Shen 2011). However, few studies have empirically examined the factors unique to public hospitals that permit these conditions of "soft constraints" and contribute to their relative sustainability.

Existing models of closure and conversion may not apply to public hospitals, given their unique governance, financing, and mission. The limited evidence on public hospital closures and privatizations suggest an alternative framework should be applied. The few prior studies have shown that almost none of the factors predictive of hospital closure or ownership conversion in the general literature are significant when public hospitals are examined separately (Deily, McKay, and Dorner 2000; Legnini et al. 1999; Graddy and Ye 2008). Only one study, on California public hospitals from 1981-1995, introduced additional measures specific to the public policy process that guides public hospital decision-making (Graddy and Ye 2008). Graddy and Ke found that state and county budget revenues, public sector unionization, and local expenditures on health and hospitals, were associated with public hospital viability. Predictors

of hospital closures and conversions examined in past studies that were not limited to public hospitals, including total and operating margins, size, or occupancy rate, were not significant.

Other evidence to suggests that in addition to local policy factors, community sociodemographic characteristics may influence hospital outcomes. Area-level income and a high black population are associated with overall safety net resources and increased utilization of safety net hospitals, net of healthcare market factors(Marquis, Rogowski, and Escarce 2004). An early study on hospital closures in New York City in the late 1970s found that the proportion of neighborhood residents who were black were associated with closure (Schatzkin 1984). More recent research has shown that trauma centers are more likely to close in communities with a larger black population, and emergency departments serving a larger black patient population are more likely to close (Whiteis 1992; Shen, Hsia, and Kuzma 2009; Hsia et al. 2011). Prior studies on public hospitals have examined effects of area-level poverty rates, income, and non-white racial composition, and found no association between these measures and public hospital outcomes (Gaskin et al. 2011; Deily, McKay, and Dorner 2000; Graddy and Ye 2008; Needleman and Ko In press). However, more recent literature has argued that compositional measures at larger areal units (counties and states) may not capture the effects of community context because it is the distribution of resources within an area, not the average level, that drives disparities in access to care(Gaskin et al. 2011). Residential segregation, “the degree to which two or more groups live separately from one another in different parts of the urban environment,” may influence the way in which services and resources are allocated within a given region (Massey and Denton 1988). Failure to account for residential segregation, particularly of low-income minority groups, may explain why prior studies have not found significant effects for area-level socioeconomic status or racial composition.

A number of studies have demonstrated that residential segregation may contribute to disparities in access to care. Residential segregation is associated with reduced visits to healthcare providers, lower rates of insurance coverage, and increased time to renal transplantation (Gaskin et al. 2011; Rodriguez et al. 2007; Anderson 2011). Studies of integrated communities have found that black-white disparities in access to care are either eliminated or even reversed (Gaskin et al. 2009; LaVeist et al. 2011). There is some evidence to suggest that these barriers to care may in part be attributable to effects on the healthcare system, as residential segregation is negatively associated with physician participation in Medicaid (Greene 06), the area-level supply of ambulatory surgical facilities, general surgeons (Hayanga 09), radiation oncologists, and gastroenterologists (Fossett and Peterson 1989; Greene, Blaustein, and Weitzman 2006; Hayanga, Waljee et al. 2009; Hayanga, Kaiser et al. 2009). Area-level residential segregation is positively associated with the number of Federally Qualified Health Centers (FQHCs), suggesting that more segregated areas have an increased need for safety net providers (Chapter 2).

New Contribution

In this study, we advance the existing literature by employing a national sample, over a period of twenty years, 1987-2007, and examine firm-level and community-level predictors of closures and privatizations of public hospitals. In tandem with the traditional theory of the firm, we build a more expansive predictive model that elaborates the role of community context in decisions to close or privatize public hospitals. We present a conceptual framework in which community characteristics- specifically, residential segregation by socioeconomic and racial/ethnic characteristics- impact public hospitals through three distinct pathways: (1) direct

effects on the hospitals; (2) indirect effects on local healthcare markets; and (3) indirect effects on the local policy context.

Policymakers would benefit from a greater understanding to what degree residential segregation may influence the healthcare safety net. Of critical concern is whether already disadvantaged populations are at even greater risk for losing access to public hospital services. If residential segregation contributes to disparities in access to care, are public hospitals more likely to be maintained in order to fill the gaps? Or, do public hospitals close and change ownership in conjunction with an overall reduction in services for segregated areas? Furthermore, the findings of this study may also provide insight into broader questions regarding the role of community context for choices in government provision of health services.

Conceptual framework

The conceptual framework builds upon prior literature on economic theory of firm exits and sociological theory on the consequences of social stratification, and public good provision. Economic theory posits that firms exit markets in response to negative long-run profit expectations (Ciliberto and Lindrooth 2007; Harrison 2007). For hospitals, these expectations may be determined by both hospital-level and market characteristics. Hospital characteristics that influence relative efficiency, the ability to capitalize on economies of scale, and increase market share of paying patients reduce the likelihood of changes in ownership or operations. These include factors related to both hospital structure and performance, such as: hospital size, provision of advanced medical technologies, occupancy rates, nurse staffing and operating margins (Harrison 2007; Ciliberto and Lindrooth 2007; Deily, McKay, and Dorner 2000; Sloan, Ostermann, and Conover 2003). Local healthcare market conditions, particularly in the form of

competition for hospital services in general, and specifically for safety net services, also impact public hospital sustainability. However, as noted above, public hospitals can be thought of as operating under “soft budget constraints,” i.e. additional considerations that permit continued operation in light of negative profit expectations. These include relevant policy contextual factors, such as the availability of government resources, local preferences for spending on healthcare services, and the type of hospital governance(Graddy and Ye 2008).

Analogous to economic perspectives of market context, sociological theory identifies structural consequences arising from social context. Social stratification refers to the “system of social relationships” that leads to “institutionalized” social inequality(Kerbo 1996). We propose that one aspect of social stratification, residential segregation, impacts public hospitals, the local healthcare market, and the policy context, thus leading to eventual decisions regarding hospital ownership and operational status (Figure 3.1).

The role of residential segregation

Residential segregation may impact hospitals as a result of poorer community health and reduced access to ambulatory care. Residential segregation contributes to health outcomes through multiple mechanisms, including decreased educational and employment opportunities, neighborhood deterioration and loss of infrastructure, environmental hazards, and higher rates of violent crime (Williams and Collins 2001). Residential segregation is associated with higher infant mortality rates, higher BMI and odds of being overweight, lower longevity, and higher allostatic load (LaVeist, Gaskin, and Trujillo 2011; Chang 2006; Laveist 2003; Bellatorre et al. 2011). These outcomes may be compounded by increased barriers to care, as low-income and minority residents of communities with greater residential segregation may have greater difficulty in receiving timely and appropriate ambulatory care (Fossett and Peterson 1989;

Gaskin et al. 2011; Gaskin et al. 2009; Greene, Blaustein, and Weitzman 2006; Haas et al. 2008). Thus, public hospitals in regions with greater residential segregation may be responsible for patient populations with a higher burden of overall disease, and experience higher utilization resulting from preventable admissions and unmet needs for ambulatory care.

Residential segregation is thought to contribute in part to healthcare access outcomes through effects on local healthcare markets. Residential segregation may lead to geographic segmentation of health services, such that hospitals and other healthcare providers preferentially locate in white, affluent areas, and are physically distant from communities with high concentrations of the poor and racial/ethnic minorities (Fossett and Peterson 1989; Greene, Blaustein, and Weitzman 2006; Hsia and Shen 2011; Schatzkin 1984; Whiteis 1992). Providers in segregated areas may also be less inclined to serve socioeconomically and racially diverse patient panels (Greene, Blustein, and Weitzman 2006). The reluctance to mix poor, medically indigent urban patients with more affluent, suburban patients has been cited as an objection to privatizations via public and private hospital mergers(Savage 2004). Therefore, as a consequence of private provider responses correlated with residential segregation, public hospitals may experience less market competition for services.

Residential segregation may also affect the policy context for public hospital decision-making, but the direction of association is not clear. Majority (white, non-Hispanic) support for publicly-provided social services declines if those services are perceived to benefit primarily racial and ethnic minorities, particularly immigrants, and these sentiments may be exacerbated by residential segregation (Viladrich 2012; Alesina, Baqir, and Easterly 1999; Habyarimana et al. 2007). Neighborhoods with high concentrations of low-income minority residents have

experienced systematic under-investments in a number of public services, such as education, transportation, and safety (Wilson 1987; Massey 1990).

However, residential segregation may also foster political organization in support of public hospitals. Concentration of racial and ethnic minorities in segregated neighborhoods is thought to promote community organization efforts, thus explaining for example, why black residential segregation is positively associated with black political power (LaVeist 1993). When public hospitals are threatened, more segregated communities may leverage existing political organizations to resist changes in ownership or operational status. Furthermore, private sector providers may also engage in the local political process in order to maintain segregation of disadvantaged populations to safety net providers. Case studies of public hospital privatizations have reported that local private hospitals are often motivated to participate in deliberations, in order to prevent a closure that would place the responsibility of indigent care upon themselves (Bovbjerg 2000; Legnini et al. 1999).

Of note, the vast majority of research in health services has examined residential segregation by black race, rather than by income or ethnicity. In this study, we differentiate residential segregation by income, race, and ethnicity for a number of reasons. First, we anticipate independent effects of segregation by poverty versus race/ethnicity. For example, the proposed effects of residential segregation regarding community organization are specific to racial and ethnic groups; it is not expected that concentrated poverty facilitates collective action in the same fashion (Wilson 1987; LaVeist 1993; Putnam 2007). Second, black race and Hispanic ethnicity correspond to distinct populations, with different health and access outcomes, as well as processes of immigration and urban settlement. Because Hispanic populations have a more recent history of community formation, Hispanic communities may be less likely to have

historical ties to public hospitals, or developed the levels of political organization seen in urban Black communities, for the years covered by the study period. Also, the heterogeneity of the Hispanic population within and across urban communities may limit observed associations broadly captured as overall Hispanic residential segregation. Therefore, we expect potentially stronger effects for black versus Hispanic residential segregation in regards to the policy context for public hospitals. Third, the policy implications for segregation by poverty versus race/ethnicity are substantively different, and thus it would be informative to understand whether these distinctions impart meaningful differences in outcomes.

Closure vs. Privatization

The proposed framework addresses the sustainability of public provision of hospital services. In response to unfavorable conditions, those who control public hospitals may seek to close the facility, or transfer the hospital to private ownership. However, conversions to private ownership typically require a private entity willing to assume responsibility of the facility, through sale, merger, or formation of a new corporation (Bovbjerg 2000; Legnini et al. 1999; Needleman and Ko In press). Hospitals with a more robust fiscal outlook (e.g. relatively higher operating margins, a larger share of Medicare rather than Medicaid patients), may be more attractive for an acquisition (Needleman and Ko In press). As described above, residential segregation may result in fewer private hospitals willing to provide safety net services and thus may reduce the likelihood that a private entity would be motivated to take over the public hospital. However, residential segregation may be also associated with increased political support for privatization in order to maintain at least some services, if the perceived alternative is closure of the facility and loss of all services to disadvantaged, segregated communities.

Under this framework, we present the following hypotheses:

1) Residential segregation by both poverty and race/ethnicity will be associated with a lower likelihood of public hospital closure. Public hospitals in segregated areas may experience increased utilization of services, decreased market competition from private providers, and greater political support from both community and private sector interests.

2) Residential segregation will also be associated with a reduced likelihood of privatization due to the lack of private entities willing to assume the burdens of care for areas of concentrated disadvantage that disproportionately provide safety net services. However, the associations for privatization may be relatively weaker than those for closure, because political support for privatization will be mixed.

3) The effects of residential segregation by black race, particularly for closure, will be greater than that of poverty or Hispanic ethnicity. As a result of relative maturity of community formation, segregated black communities may be more likely to engage in collective efforts to resist changes in ownership or operational status.

Methods

Data sources

Data on hospital and market characteristics were obtained from the American Hospital Association (AHA) Annual Survey, which is administered each year to all U.S. hospitals and has an overall response rate of 90% (Thorpe, Florence, and Seiber 2000). Hospitals report on services, utilization, ownership and expenditures. Further investigation of the AHA dataset identified a substantial number (~10%) of status changes that were incorrectly coded. Therefore, considerable effort was made to confirm ownership and operational status through phone

contact, personal written communication, and hospital directories and websites, and the dataset was updated as necessary. Additional data on hospital operating margins were obtained from the Centers for Medicare and Medicaid annual hospital Cost Reports.

County-level data were derived from the 2010 USA Counties database, a compilation of data from government agencies and private organizations. This study utilizes variables from several sources, including population variables derived from the decennial U.S. Census; (2) local government revenues and expenditures from the U.S. Census Bureau; and (3) voting patterns in federal presidential elections from the Congressional Quarterly Press.

Census tract-level data from the 1990 Census Summary File Tape 3A 1990 (STF3A), and the 2000 Summary File 3 (SF3) were extracted from the Neighborhood Change Database (Tatian 2007), which uses standardized geographic boundaries, thus allowing for comparable measures from one decennial Census to the next. Nearly 49% of tracts were redefined from the 1990 to 2000 Census (Tatian 2007). Pursuant to this study, tract-level data were used to construct county-level measures of residential segregation. Changes in residential segregation over time can thus be more closely attributed to demographic shifts, rather than shifting tract boundaries for each Census administration (Massey and Denton 1988).

Study Population

This study examines the population of urban U.S. nonfederal general acute care public hospitals from 1987 to 2007. The AHA Survey dataset contains data on 143,829 hospital-year observations from the years 1984 to 2007. (Data are used from 1984 in order to include lagged variables for the years prior to 1987). From this set, the following exclusions were made: 2,246 observations from hospitals located in U.S. Associated Areas; 21,493 from long-term and

subspecialty care hospitals; 58,661 from rural areas; 52,336 from hospitals under private or federal ownership in 1987; 2 duplicated observations; 1233 observations from 1984 to 1986 (prior to the start of the study period). Rural was defined as location in a non-Metropolitan Statistical Area at the study baseline, 1987. Following these exclusions, the baseline sample consisted of 415 acute care, general medical and surgical hospitals located in metropolitan areas in the 50 U.S. states under public nonfederal ownership in 1987, producing 7858 observations from 1987 to 2007. Of this set, 1736 observations occurred after the primary event of interest, closure or privatization, and were thus also removed from analyses. Following imputation procedures for missing data (described below), the final analytic sample consisted of 6121 observations for analysis.

Measures

Dependent variables

Hospital closure was defined as discontinuation of all inpatient acute care services, or discontinuation of all operations, for a period of 5 or more years. Hospital privatization was defined as a change in ownership to not-for-profit or for-profit ownership. Of note, there were no conversions to federal ownership during the study period.

In the 20-year study period, hospitals may have experienced one or multiple ownership and operational status changes. For this study, to reduce complexity of analysis and maintain clarity with the conceptual framework, outcomes are defined as the first event to occur, either closure or privatization. Subsequent observations were then censored from analyses.

Independent variables

Community characteristics

Community socioeconomic status was measured by both the county median household income and the poverty rate, defined as the percentage of households with incomes below 100% of the Federal Poverty Level. Community racial and ethnic composition measures included the percentage of Black residents and the percentage of Hispanic residents. We also controlled for aggregate demand for hospital services with a measure of the total population. Values on community characteristics in 1990 were carried forward from 1987 to 1999. Values from 2000 were carried forward from 2000 to 2007.

Residential segregation was measured using the Dissimilarity Index (DI), which is interpreted as the proportion of minority residents who would have to move, in order to create an even distribution of minorities across the county. The DI is calculated from the population characteristics of the larger area (county) and areal subunits (census tracts) as follows:

$$D = \frac{\sum_i |t_i p_i - P_i|}{2TP(1 - P)}$$

where t_i and p_i are the total population and minority proportion of census tract i , and T and P are the total population and minority proportion of the county (Massey and Denton 1988). The DI ranges from 0, no segregation, to 1, complete segregation. We calculated the DIs for poor versus non-poor, Black versus non-Black, and Hispanic versus non-Hispanic, constructed from 1990 and 2000 Census tract and county data. Metropolitan counties in the Northeast and Midwest exhibited the highest degree of segregation, with racial segregation typically exceeding that of ethnicity and poverty. For example, in 1990, Cuyahoga County, Ohio had a Black DI of 0.84, a Hispanic DI of 0.55, and a poverty DI of 0.53. Cook County, Illinois had a Black DI of 0.83, a Hispanic DI 0.63, and poverty DI of 0.48. Counties in the South tended to have the lowest levels

of segregation by race and poverty. Butts County, Georgia had a Black DI 0.19 and a poverty DI 0.07. Yadkin County, North Carolina had a Black DI 0.20, and a poverty DI 0.07. Counties with low Hispanic residential segregation were more often located in the Southwest and Western regions, with Shasta County, California and Coryell, Texas, having a Hispanic DI of 0.10. Counties were then categorized into tertiles, with indicators for low segregation, defined as 25th percentile, medium segregation, 25th-75th percentile, and high segregation, 75th percentile. Values were carried forward as described above for the measures of community composition.

Hospital characteristics

Hospital characteristics included bed size, teaching status, provision of advanced medical technology services, and provision of unique specialty care services. Teaching status was defined as a positive response for any of the following items: residency training approval by the Accreditation Council for Graduate Medical Education, medical school affiliation reported to the American Medical Association, or member of the Council of Teaching Hospitals Association of America. The provision of high technology services was measured as a count of the following: extra-corporeal shock-wave lithotripsy, computed tomography scans, magnetic resonance imaging, positron emission tomography, diagnostic radioisotope, single photon emission computerized tomography, radiation therapy, and ultrasound (Ciliberto and Lindrooth 2007). Provision of unique specialty care services was measured by a dichotomous indicator for whether the hospital offered at least one of the following: neonatal intensive care, trauma, burn, or psychiatric emergency services.

We employed several variables to proxy for the performance of the hospital, including occupancy rate, log nurse-bed staffing ratio, and whether the hospital had been accredited by the

Joint Commission on Accreditation of Health Care Organizations (JCAHO). Standardized measures of quality of care had not yet been developed for the earlier portion of the study period, and so JCAHO accreditation serves as a limited proxy for hospital quality of care. The payer mix was measured as the proportion of inpatient days each paid by Medicare and Medicaid. Patient care operating margins were derived from the CMS Cost Reports. (cite)

Health care market characteristics.

The Herfindahl-Hirschman Index (HHI) for hospital beds within the county was used to estimate hospital market competition.¹ HHI reflects overall competition for hospital services, with values approaching 1 indicating complete concentration, i.e. low competition, and values approaching 0 indicating high competition.

We also employed a measure of the safety net role of the hospital in a given market, based upon the hospital’s relative share of Medicaid inpatient care in the county. This measure is calculated as follows:

$$D_i = \frac{(m_i/M)}{(h_i/H)}$$

where m_i and M are the total count of Medicaid inpatient days for the hospital and the county, respectively, and h_i and H are the total count of all inpatient days for the hospital and the county. This measure is interpreted as the degree to which the hospital disproportionately cares for Medicaid patients, relative to its overall market share of the inpatient population. We have previously demonstrated that this measure, deemed the “safety net index,” is positively

¹ The HHI was calculated as follows: $HHI = \frac{h_i^2}{\sum h_i^2}$, where b represents the number of beds of hospital i , and B represents the total number of beds in the market, defined as the county.

associated with public hospital closure, net of individual hospital and market characteristics(Needleman and Ko In press; Ko and Needleman 2008).

Because the process for status changes typically occurs over a prolonged period of time, we expect that hospital and market characteristics will be relevant for a period prior to the outcome. We estimated models using variables lagged both one and three years, and found that associations were strongest for 3-year lagged variables.

Policy context

Local government support was measured as per capita county revenues. Because these measures were only available from USA Counties at 5-year intervals, prior-year values were carried forward until the next available year of data. Percentage of county electorate that voted for all Democratic candidates in federal presidential elections was used to capture local preference for government provision of social services(Graddy and Ye 2008; Choi et al. 2010). Prior presidential election values were carried forward until the next election year. Preference for spending on health and healthcare versus other types of government programs and services was measured by the proportion of county government expenditures allocated to hospitals and health care. Local expenditures data were also only available at 5-year intervals, and carried forward as described above. In order to examine the independent effect of hospital jurisdiction, indicator variables for whether the hospital is controlled at the state, district, or city-county level were also included in analyses. Preliminary examination showed little difference between state- and district-controlled hospitals, and thus final models included a single indicator for city-county control.

Use of county as geographic unit of analysis

U.S. counties vary considerably in geographic area and population size, and this heterogeneity across areas may bias community contextual effects towards zero. There are multiple methods for calculating the hospital market area, including those based on patient origins, but this data is not readily available for a national sample for the duration of the study period, and use of counties is a commonly accepted alternative under these circumstances(Thorpe, Florence, and Seiber 2000). Furthermore, in contrast to private hospitals, public hospitals have mandated service areas that correspond to a political jurisdiction, and thus alternate measures such as variable hospital radius may not apply. In this population, 87% of the hospitals were under city, county, or hospital district jurisdiction. Interpretation of contextual effects are limited in recognition that use of the county inherently involves an approximation, rather than a directly corresponding measure (e.g. effect of per capita county revenues reflects general resource availability, rather than the specific resources available to that hospital).

Approximately 10% of hospital-year observations contained missing data on high technology, unique specialty, and operating margins. Missing values on hospital characteristics were imputed using multiple regression imputation with the ice procedure in Stata, and 20 replicate sets were created and imported using the mi import command(StataCorp 2009). Policy and sociodemographic contextual characteristics were not available on an annual basis and replaced with carry-forward values as described above.

Statistical Analysis

We used Cox proportional hazards regression models to estimate the effects of the independent variables on the log hazard of each outcome, closure or privatization. Conditions of the proportional hazards assumption were tested using scaled Schoenfeld residuals. Proportional

hazards testing indicated that the effects of nurse-staffing ratios were not constant over time, and thus an interaction term with nurse staffing and year was included in the models.

Given our interest in examining two potential but mutually exclusive outcomes, we performed competing risks regression for closure vs. privatization, relative to remaining open and under public ownership. We performed two sets of regressions, the first for exit from the market by closure, with censoring of conversion as an alternative failure event, and the second with exit by privatization, with censoring of closed hospitals. The Efron method was used to handle tied event times, which can produce reliable estimates at large (greater than 200) sample sizes(Hertz-Picciotto and Rockhill 1997).

Because public hospitals are particularly dependent on state-level policies, such as Medicaid reimbursement, Disproportionate Share Hospital payments, and uncompensated care pools, we anticipated within-state correlation of standard errors. We estimated models with state-level strata, which assumes that the parameter coefficients are equal, but each state has a unique baseline hazard function. We furthermore accounted for potential within-county correlation by using county-level clustered robust standard errors.

Although hospital status changes can theoretically occur at any point throughout a given year, the event of interest is conceptually appropriate for a continuous-time method such as Cox proportional hazard models(Singer and Willett 2003). However, the data were discretized on an annual basis as a result of the data collection method, the AHA survey, and thus prior studies have utilized both continuous and discrete-time analytic methods to examine hospital facility closures(Sloan, Ostermann, and Conover 2003; Harrison 2007; Hsia and Shen 2011; Shen, Hsia, and Kuzma 2009). Therefore, we also repeated analyses using discrete-time proportional hazard

models to assess for differences based upon statistical method. Stata 11 was used to perform all analyses(StataCorp 2009).

Results

In 1987, 415 acute care, general medical surgical metropolitan hospitals were under public, nonfederal ownership. Over the next 20 years, 40 hospitals closed and 156 converted to private ownership, with 219 remaining open and public for the entire period (Table 3.1.a). At baseline, the average public hospital staffed 249.25 beds, offered about 2 high technology services, with a mean 61% occupancy rate, and over 50% of discharges were covered by either Medicare or Medicaid. Hospitals were located in counties that allocated an average of 13% of local government expenditures on health and hospitals, and received a mean \$1,770 in revenues per capita per year. City or county governments controlled slightly less than half, 47%. Neither provision of unique specialty services nor Democratic voting percentage were associated with outcomes in bivariate or multivariate analyses, and were thus excluded from final models.

The average county poverty rate for all hospitals in the sample was 14%, with a mean poverty Dissimilarity Index (DI) of 0.31. The mean black percentage was 13%, with a black DI of 0.53, and the mean Hispanic percentage was 9%, with a DI of 0.35. In bivariate analyses, only a medium level of black residential segregation was associated with a lower rate of hospital closure ($p=0.038$), relative to a low level of segregation (Table 3.1.b).

In multivariate analyses, community characteristics remained significant when controlling for hospital, market and policy factors, but the findings differed considerably for closures versus privatizations (Table 3.2). While privatizations were more common than closures, few variables were associated with privatization. Among community characteristics,

closure was associated with poverty and black percentage, and residential segregation on both dimensions. In contrast, privatization was only associated with Hispanic residential segregation, not the Hispanic percentage or any poverty-related measures.

For closures, a one-percentage-point higher area-level poverty rate was associated with 26.6% higher hazard of the outcome ($p=0.013$). We found that poverty residential segregation was also associated with the closure rate in a nonlinear relationship—high and low residential segregation measures were significant, relative to medium residential segregation. Location in an area with low poverty residential segregation was associated with nearly a 92% lower hazard of closure ($p=0.005$), relative to location in an area with medium residential segregation. High area-level poverty residential segregation was also associated with a lower hazard of closure, relative to medium segregation, with approaching statistical significance ($p=0.092$).

Both black racial composition and residential segregation were negatively associated with the likelihood of public hospital closure over time. A one-percentage point increase the black population was associated with a 12% lower hazard of closure ($p=0.001$). Unlike the findings for poverty residential segregation, an association was observed for medium levels of black residential segregation, relative to low levels of residential segregation. A medium level of black residential segregation was associated with 71% lower hazard of closure, relative to low black residential segregation ($p=0.015$). The hazard ratio for a high level of black residential segregation, relative to low, was also less than one, but this association was not significant.

For privatizations, both medium and high Hispanic residential segregation were associated with an approximately two-fold increase in the hazard of the outcome, relative to low levels of segregation ($p=0.007$ and $p=0.048$, respectively).

Of note, when we performed analyses using discrete-time proportional hazards models, findings were consistent with those produced by Cox proportional hazards models. Because statistical software methods, particularly for multiply imputed datasets, have been more extensively developed for Cox models, we have chosen to present the findings from these models (StataCorp 2009).

Discussion

Our findings suggest that community socioeconomic and racial/ethnic characteristics influence eventual decisions to close or privatize urban public hospitals, net of individual hospital characteristics, healthcare market factors, and local policy context. However, the relationships appear markedly different for closures versus privatizations. Hospitals in communities with high poverty rates, as well as those with intermediate residential segregation, experienced a higher risk of closure over time. When controlling for these effects, hospitals in areas with a higher black population and black residential segregation were less likely to close. None of these factors was significantly associated with privatization; instead, hospitals in communities with greater Hispanic residential segregation experienced a higher hazard of privatization, relative to staying under public ownership.

The significant and large hazard ratio for high-poverty communities suggests that those areas with a high need for safety net services may also be most likely to lose them. The combined effects of a large burden of uncompensated care and limited resources over time are likely to bring about the demise of public hospitals in high poverty areas. However, we found a nonlinear effect for residential segregation by poverty, with greatest vulnerability for intermediate levels of segregation (Figure 3.2). This was somewhat unexpected, as we hypothesized that in areas with lowest segregation by income, health outcomes are better and

private sector providers may be more likely to assume care for indigent populations if the burden of care is spread out across facilities. One possible explanation is that in areas with very low poverty segregation, a larger proportion of paying patients utilize public hospital services. Racial residential segregation is positively correlated with hospital segregation; the same trend may apply to residential segregation by income (Vaughan Sarrazin et al. 2009; Stevens 1999). By serving patients from a wider socioeconomic range, public hospitals likely have more stable financial conditions and a broader segment of the population that would support its existence. Additionally, areas with low segregation may have more positive attitudes toward public provision of healthcare services. In contrast, in areas with high levels of poverty segregation, both (more affluent) residents and other (private) hospitals in the community may resist closure of the public hospital, in order to prevent the exodus of indigent patients to private facilities. Public hospital vulnerability therefore lies in communities somewhere in the middle of the extremes of economic segregation and integration.

Given that other providers are more likely to close in nonwhite communities, net of socioeconomic factors, our findings further suggest that public hospitals continue to provide a critical safety net service to urban black communities, particularly those in more segregated areas (Figure 3.3). This may be because public hospitals have historically provided not only much-needed health services, but also have served as a key source of employment and political patronage in urban areas (Stevens 1999). Descriptive reports of hospital closures and privatizations have repeatedly cited the importance of community advocates and public sector unions in shaping hospital outcomes (Bovbjerg 2000; Legnini et al. 1999; Regenstein and Huang 2005). Segregated black communities may have a greater capacity to leverage existing political organizations to resist closure of public hospitals.

In contrast to the findings for closures, we found few community characteristics associated with privatization. We confirm prior findings that on average, hospitals that privatized had higher operating margins, higher shares of Medicare and lower shares of Medicaid patients, and a lower safety net index, suggesting that hospitals that convert have less of a safety net role in their local areas and are thus more attractive for acquisition (Needleman and Ko In press). As a result, the influence of community characteristics may be diminished. Community resistance may be lower for privatization versus closure- services are maintained, and the hospital is a less critical source of care for disadvantaged populations. However, we unexpectedly found that Hispanic residential segregation is positively associated with privatization of public hospitals (Figure 3.4). Hispanic residential segregation could exacerbate non-Hispanic reluctance to provide healthcare services to Hispanic populations, particularly as anti-immigrant rhetoric has decried the use of public services by undocumented residents (Viladrich 2012). With a relatively shorter history of community formation, Hispanic communities may not have the same historical ties, community advocacy groups, and perhaps most importantly, relationships to public sector unions seen in black urban communities, for the time period covered by this study. Increased heterogeneity in the Hispanic population, relative to the black population, may also reduce the potential for community political organization based upon ethnic identity. Thus, Hispanic residential segregation may not facilitate collective political action to resist public hospital changes.

Implications for policy and practice

The pressures to devolve public hospitals, either through closure or privatization, have increased in recent years. The economic recession and persistent high unemployment rates have resulted in increased demand for services, with inpatient discharges at public hospitals increasing

at a rate outpacing that of the private sector(Study reveals NAPH members are 'Providers of Choice' for all patients 2011). Unable to cope with rising healthcare costs and local and state budget crises, numerous regions have sought to terminate public hospital services. The independent effect of poverty rates, net of both area-level income and revenues, suggest that an economic recovery that favors the wealthy will not protect public hospitals from closure. This may be particularly prominent in areas where a depressed housing market has shifted poverty residential segregation from low to intermediate levels. The effects for residential segregation by poverty suggest that urban planning policies, such as revitalization efforts and mixed-income development, should be evaluated for downstream implications for health services.

Preliminary data from the 2010 Census indicate that residential segregation for both blacks and Hispanics is declining(Frey 2011). These trends in residential segregation may lead to improved health outcomes and access to ambulatory care for racial and ethnic minorities, although it should be recognized that residential segregation overall remains high and substantial healthcare disparities persist. Our findings suggest that the potential gains may be partially offset by a loss in safety net services. The reduction in black residential segregation, in conjunction with a rise in poverty, may spur a shift towards public hospital closures. Whether disadvantaged populations experience heightened disparities in access to hospital care will depend critically upon whether hospital closures reflect an increased willingness of the private sector to care for minority patients, or diminished community capacity to resist closure. Thus policies related to increased scrutiny of hospitals, particularly justification for tax-exempt status for not-for-profit institutions, should examine outcomes for minorities and assess whether residential segregation contributes to the likelihood that these hospitals will serve members of racial/ethnic minority groups.

We chose to focus this study on local determinants of public hospital status changes, and further investigation is needed on how local factors may affect the outcomes of state and federal policies. The net impact of the Patient Protection and Affordable Care Act (PPACA) on public hospitals is unclear. An estimated 23 million will remain uninsured, and coverage expansions largely hinge on expansions in Medicaid eligibility (Milstein, Homer, and Hirsch 2010). To the extent that residential segregation may affect the availability of hospitals to care for those covered by Medicaid and uninsured, disparities in care may persist or widen after enactment of PPACA. Public hospitals have also received crucial support from Disproportionate Share Hospital, and the new guidelines that will replace current formulations should consider contextual factors that affect a hospital's role as a safety net provider in the community.

Limitations

This study carries a number of limitations, particularly as a consequence of use of a national sample over a 20-year period. Due to lack of consistent data for the population and study period, we were unable to include other measures, such as whether the hospital is governed by an independent board, or whether hospitals obtained Medicaid managed care contracts. However, we have no strong theoretical reason to believe that the effects of community sociodemographic characteristics operate via these pathways above the policy contextual factors already included. We also were unable to include more comprehensive measures of the local healthcare market, including managed care penetration and the supply of other safety net providers. Prior research has found no association between HMO penetration and safety net supply, and in this study we also confirmed no significant relationship between hospital competition and hospital outcomes (Marquis, Rogowski, and Escarce 2004). We suspect that a

more nuanced factor related to the policy context, such as whether or not public hospitals were able to access Medicaid managed care contracts, is significant to hospital survival, but there is no known connection between this type of factor and residential segregation to suggest a way in which estimates would be biased. We did not include other measures such as the number of community health centers (CHC), but the positive correlation between CHC supply and public hospital utilization suggests that safety net resources are complements, rather than substitutes (Marquis, Rogowski, and Escarce 2004). We have also previously shown a similar positive association between residential segregation and the number of Federally Qualified Health Centers, suggesting that residential segregation is associated with an overall increased demand for safety net services (Chapter 2). Lastly, we chose to study the first event to occur, either privatization or closure, and thus our interpretations are limited to factors affecting the initial decision process, not the final disposition of the hospital. The majority of closures and privatizations remained unchanged by the end of the study period. Of the forty hospitals that initially closed, one reopened as private hospital and two reopened as public hospitals (after periods of 5 or more years of closure). As of 2007, 11 of the 156 hospitals that initially privatized had closed, and 17 converted back to public ownership. Given the small number of hospitals that experienced multiple status changes, additional research into these types of changes would likely require qualitative examination.

Future directions for research

Our study highlights the need for further research on the unique circumstances of safety net hospitals, both under public and private ownership. The relatively sparse findings related to public hospital privatization suggest that empirical research should look to alternative concepts and measures. Public hospital managers have cited not only fiscal pressures, but also interest in

shifting to outpatient care, increased flexibility in management, and improved access to capital as motivations to seek privatization(Needleman and Ko In press). Underlying all of these motivations is the overarching conclusion that American public interest in local funding of hospital services for indigent patients has diminished, and there is increased pressure to transform public hospitals from a provider of “last resort” to serving a wider socioeconomic base(Needleman and Ko In press; Bovbjerg 2000; Stevens 1999). Case studies of privatization have attributed formation of coalitions between local governments, neighboring private hospitals, public employee unions, and patient advocacy groups as critical to achieving a conversion that maintains the hospital’s commitment to safety net services(Bovbjerg 2000; Legnini et al. 1999; Savage 2004). None of these studies have reported what role, if any, has been played by Hispanic communities in these processes. At present, formulations of healthcare safety net policies and planning do not factor in the consequences of residential segregation by income or race and ethnicity. Assuming the ongoing decline of the public hospital sector continues, it is clear that greater understanding of these relationships is needed to ensure access to care for disadvantaged communities.

Figure 3.1. Conceptual framework for relationships between community, policy context, healthcare market, hospitals characteristics, and eventual decisions to close or privatize public hospitals.

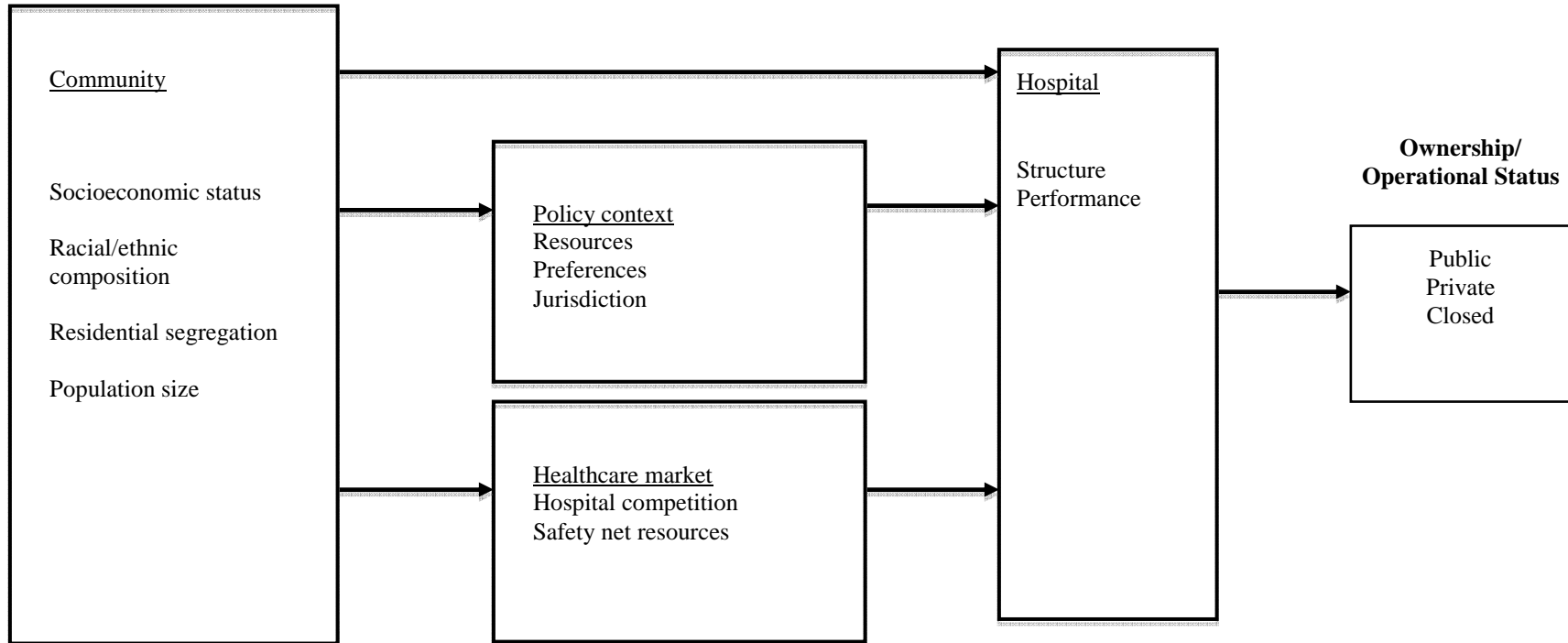


Table 3.1.a. Hospital, market and community characteristics of U.S. public hospitals at baseline in 1987. Mean (SD) reported for continuous variables and percentage (frequency) for categorical variables. ^aReported in thousands.

	All (N=415)		Public (N=219)		Closed (N=40)		Private (N=156)	
Community characteristics								
%Poor	13.64	(5.53)	13.90	(5.56)	13.91	(5.71)	13.20	(5.45)
Poverty Dissimilarity Index	0.31	(0.10)	0.31	(0.10)	0.32	(0.10)	0.31	(0.11)
%Black	12.86	(12.58)	13.39	(12.12)	9.64†	(12.88)	12.96	(13.09)
Black Dissimilarity Index	0.53	(0.20)	0.54	(0.24)	0.53†	(0.15)	0.52	(0.15)
%Hispanic	8.99	(12.83)	9.84	(13.04)	11.91	(14.26)	7.05	(11.91)
Hispanic Dissimilarity Index	0.35	(0.11)	0.34	(0.12)	0.37	(0.13)	0.35	(0.10)
Median household income ^a	27.41	(5.3)	27.30	(5.14)	27.98	(5.35)	27.41	(5.69)
Total population ^a	642.32	(1238.54)	710.30	(1303.47)	820.87	(1813.29)	501.10	(919.48)
Policy context								
% government expenditures on health and hospitals	13.03	(9.22)	13.06	(9.61)	9.54	(6.17)	13.87	(9.14)
Revenue per capita ^a	1.77	(0.99)	1.87	(1.22)	1.82	(0.88)	1.61	(0.52)
County/City governance	46.75	(194)	44.29	(97)	55.00	(22)	48.08	(75)
%voting Democratic	38.83	(11.06)	38.86	(11.44)	41.95	(12.50)	37.99	(10.01)
Market								
HHI	0.36	(0.32)	0.35	(0.31)	0.30	(0.25)	0.40	(0.33)
Safety net index	1.30	(0.89)	1.38	(0.84)	1.47	(1.20)	1.16	(0.84)
Hospital								
Bed size	249.25	(232.37)	288.68	(261.38)	200.48	(260.03)	206.40	(162.67)
Teaching (yes/no)	33.25	(138)	43.38	(95)	25.00	(10)	21.15	(33)
Count of high technology services	1.96	(1.44)	2.13	(1.44)	1.13	(1.40)	1.94	(1.37)
Unique specialty services (yes/no)	53.73	(223)	61.19	134	30.00	(12)	49.36	(77)
Nurse staffing ratio	0.65	(1.85)	0.69	(1.80)	0.44	(2.08)	0.67	(1.80)
Occupancy rate	60.85	(18.68)	64.66	(17.65)	54.93	(23.88)	57.02	(17.50)
% Medicare	37.34	(16.32)	35.04	(17.41)	35.34	(18.04)	41.09	(13.43)
% Medicaid	17.70	(15.64)	19.14	(16.50)	21.42	(17.67)	14.72	(13.29)
Operating margins	-0.18	(1.08)	-0.14	(0.58)	-0.35	(1.43)	0.04	(0.28)
JCAHO accreditation (yes/no)	91.57	(380)	90.87	(199)	92.50	(37)	92.31	(144)

Table 3.1.b. Hospital, market and community characteristics of total sample of pooled hospital-year observations used for analysis: U.S. public hospitals from 1987 to 2007. N=6121. Mean (SD) reported for continuous variables and percentage (frequency) for categorical variables. †p<0.1; *p<0.1; **p<0.05; ***p<0.01. ^aReported in thousands.

	All (N=6121)		Public (N=4453)		Closed (N=359)		Private (N=1309)		
Community characteristics									
%Poor	13.48	(5.50)	13.58	(5.43)	14.62	(5.69)	12.81	(5.62)	
Poverty Dissimilarity Index	0.30	(0.10)	0.30	(0.09)	0.31	(0.09)	0.30	(0.11)	
%Black	12.93	(12.24)	13.21	(11.98)	11.54	(14.79)	12.37	(12.29)	
Black Dissimilarity Index	0.53	(0.22)	0.54	(0.24)	0.54	(0.14)	0.50	(0.14)	
%Hispanic	9.67	(13.04)	10.09	(13.10)	15.29	(15.12)	6.72	(11.44)	
Hispanic Dissimilarity Index	0.35	(0.12)	0.34	(0.12)	0.38	(0.12)	0.35	(0.10)	
Median household income ^a	38.26	(10.77)	39.66	(10.93)	35.10	(8.46)	34.34	(9.59)	
Total population ^a	771.24	(1457.57)	815.70	(1461.03)	1406.15	(2646.84)	445.87	(730.79)	
Policy context									
% government expenditures on health and hospitals	14.40	(10.72)	14.64	(11.14)	10.01	(6.11)	14.77	(9.99)	
Revenue per capita ^a	2.80	(2.49)	3.06	(2.73)	2.84	(2.73)	1.90**	(0.70)	
County/City governance	42.44	(2598)	39.39	(1754)	60.45**	(217)	47.90	(627)	
Market									
HHI	0.37	(0.32)	0.36	(0.32)	0.28	(0.26)	0.43	(0.34)	
Safety net index	1.37	(1.00)	1.41	(1.00)	1.55	(1.08)	1.19**	(0.96)	
Hospital									
Bed size	268.39	(245.37)	286.22	(254.59)	247.10*	(297.37)	213.58**	(180.74)	
Teaching (yes/no)	40.66	(2489)	45.72	(2036)	39.83**	(143)	23.68***	(310)	
Count of high technology services	2.82	(1.81)	3.05	(1.82)	1.71***	(1.69)	2.30	(1.58)	
Log nurse staffing ratio	-0.20	(0.64)	-0.12	(0.64)	-0.52***	(0.71)	-0.36	(0.60)	
Occupancy rate	63.18	(19.97)	64.83	(20.12)	59.25***	(24.15)	58.66***	(17.15)	
% Medicare	37.46	(17.92)	36.44	(18.42)	33.61**	(19.96)	41.98***	(14.50)	
% Medicaid	22.79	(18.09)	24.25	(18.30)	27.30	(20.08)	16.56***	(15.17)	
Operating margins	-0.42	(1.36)	-0.45	(1.25)	-0.59	(1.68)	-0.27	(1.57)	
JCAHO accreditation (yes/no)	89.02	(5449)	88.70	(3950)	86.91*	(312)	90.68	(1187)	

Table 3.2. Competing hazards models of time to first closure or privatization of public hospitals from 1987-2007. N= 6121 hospital-year observations. Hazard ratios indicate relative effects of predictors on annual rates of closure and privatization. †p<0.1; *p<0.05; **p<0.01; ***p<0.001

	Closure		Privatization	
	HR	95% CI	HR	95% CI
Community characteristics				
% Poor	1.266*	(1.045 -1.534)	1.053	(0.978 -1.135)
Poverty DI (Low)	0.092**	(0.016 -0.542)	1.168	(0.683 -1.996)
Poverty DI (High)	0.345†	(0.102 -1.161)	1.385	(0.884 -2.144)
%Black	0.882**	(0.816 -0.953)	1.010	(0.984 -1.037)
Black DI (Medium)	0.283*	(0.095 -0.845)	0.745	(0.464 -1.197)
Black DI (High)	0.870	(0.201 -3.767)	0.645	(0.346 -1.203)
% Hispanic	0.964	(0.905 -1.030)	0.986	(0.953 -1.020)
Hispanic DI (Medium)	0.515	(0.113 -2.341)	2.116**	(1.224 -3.657)
Hispanic DI (High)	0.461	(0.077 -2.763)	1.920*	(1.007 -3.660)
Median household income	0.996	(0.912 -1.087)	1.031	(0.990 -1.073)
Total population	1.000*	(1.000 -1.000)	1.000	(1.000 -1.000)
Policy context				
% government expenditures on health and hospitals	0.891***	(0.837 -0.949)	0.995	(0.971 -1.019)
Revenue per capita	0.853	(0.687 -1.058)	0.679	(0.438 -1.053)
County/City governance	3.289*	(1.125 -9.617)	1.564*	(1.051 -2.327)
Market				
HHI	0.272	(0.008 -8.957)	0.461	(0.186 -1.136)
Safety net index	3.148**	(1.373 -7.219)	0.884	(0.601 -1.300)
Hospital				
Bed size	1.000	(0.997 -1.003)	1.000	(0.999 -1.001)
Teaching	0.620	(0.208 -1.848)	0.350**	(0.188 -0.652)
High technology services	0.530**	(0.356 -0.790)	0.990	(0.855 -1.147)
Log nurse staffing ratio	0.046**	(0.005 -0.432)	2.830**	(1.359 -5.896)
Log nurse staffing ratio * year	1.364	(1.093 -1.701)	0.935*	(0.875 -0.999)
Occupancy rate	0.964†	(0.928 -1.002)	0.994	(0.982 -1.007)
% Medicare	1.102*	(1.019 -1.192)	0.999	(0.984 -1.014)
% Medicaid	1.037	(0.986 -1.091)	0.983	(0.961 -1.007)
Operating margins	1.840	(0.758 -4.465)	0.899	(0.780 -1.035)
JCAHO accreditation	0.366*	(0.135 -0.995)	1.405	(0.729 -2.707)

Figure 3.2. Cumulative hazard of urban public hospital closure, by community poverty rate and poverty residential segregation. Poverty rates and residential segregation were categorized as Low (25th percentile), Medium (>25th-75th percentile), and High (>75th percentile) for urban counties.

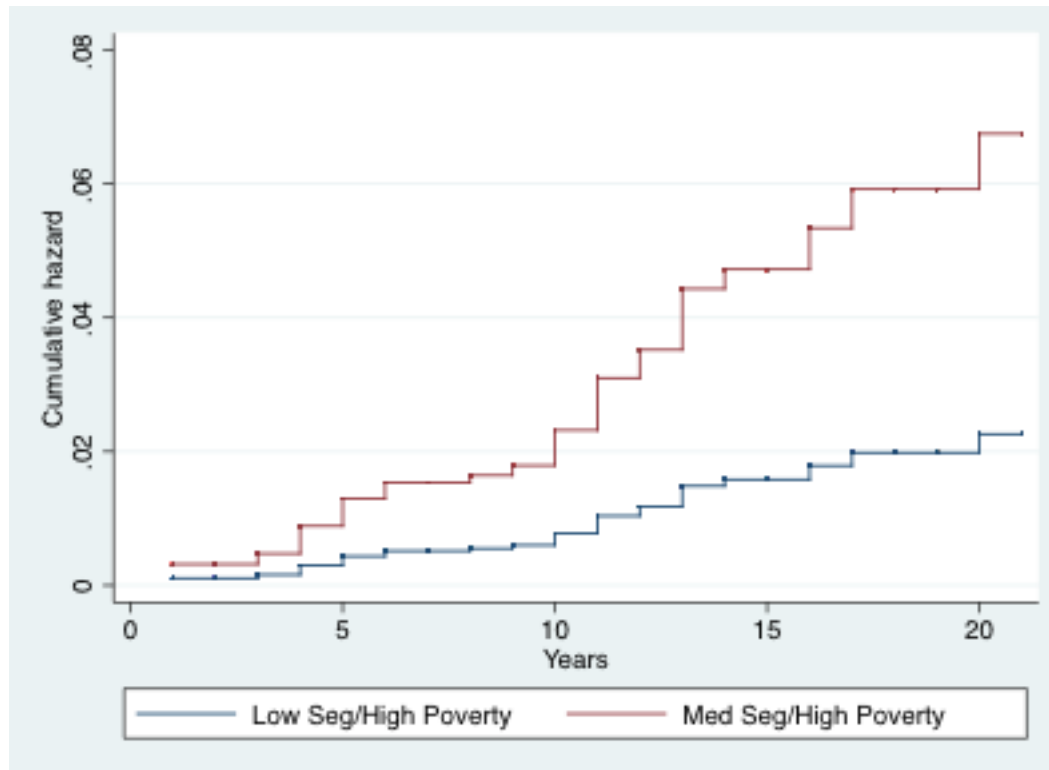


Figure 3.3. Cumulative hazard of urban public hospital closure, by community %Black and Black residential segregation. Low (25th percentile), Medium (>25th-75th percentile) and High (>75th percentile) for urban counties.

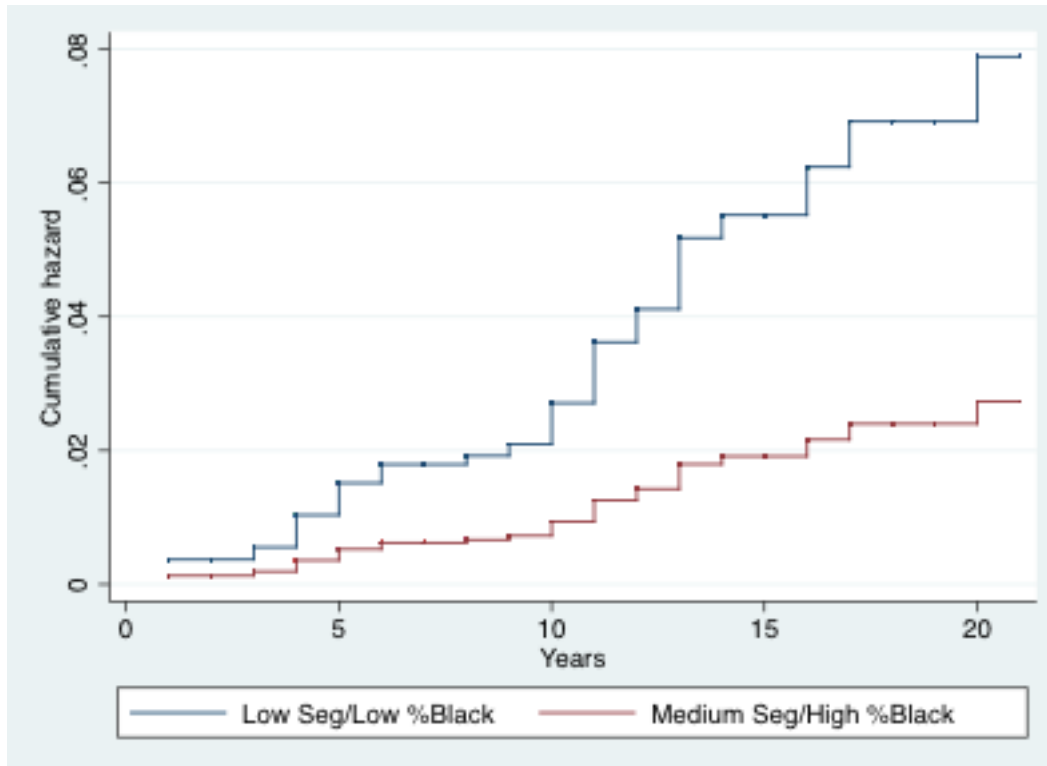
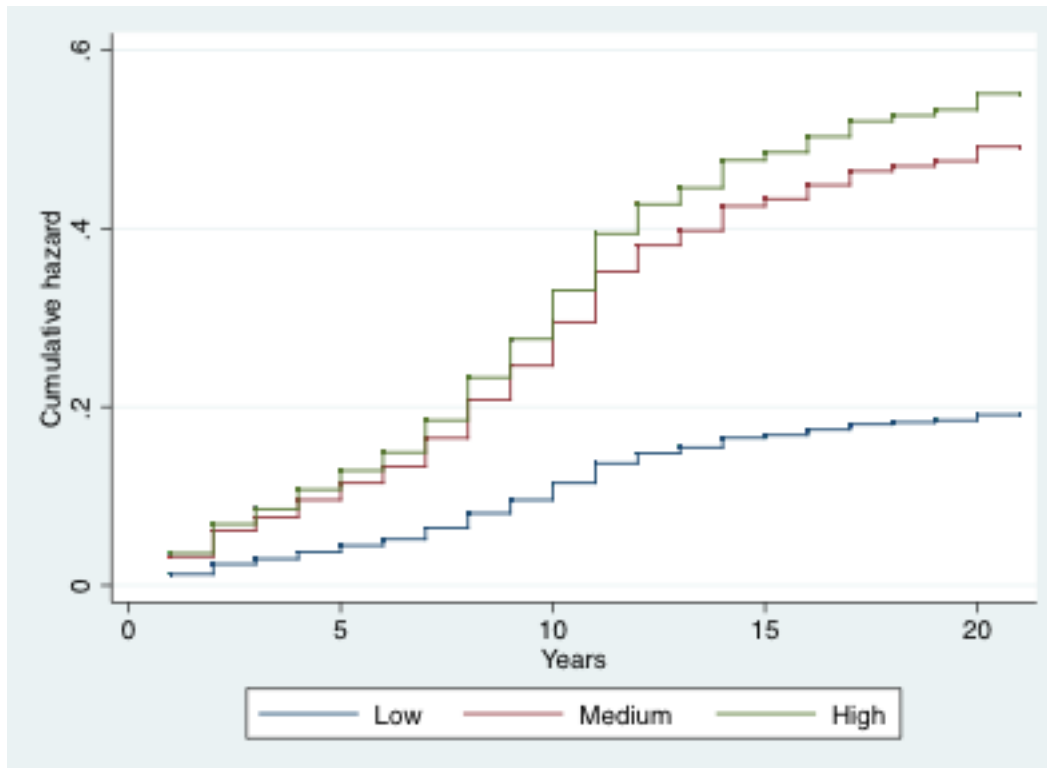


Figure 3.4. Cumulative hazard of public hospital privatization, by community Hispanic residential segregation. Hispanic residential segregation was categorized as Low (25th percentile), Medium (>25th-75th percentile), and High (>75th percentile) for urban counties.



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CHAPTER 4: Whose social capital matters? The case of U.S. urban public hospital closures and privatizations

Abstract

Urban public hospital services are a key source of safety net services for disadvantaged communities. Using a national sample of U.S. metropolitan public hospitals, we examined the effects of community social capital --- the network of relationships that cross multiple social, professional, and political bounds-- on closures and privatizations from 1987 to 2007, controlling for hospital, healthcare market, policy, and community sociodemographic characteristics. We found that community rates of voting participation were positively associated with public hospital closure over time, whereas one measure of community bridging social capital among social elites was positively associated with privatization. We found no association between linking social capital and either outcome. Taken together, our findings suggest that horizontal forms social capital among more privileged groups bear more influence on public hospital outcomes than vertical connections between disadvantaged groups (i.e., those who utilize public hospital services) and those in power.

Introduction

Public hospitals are a critical source of safety net services for the most vulnerable populations: the poor, the uninsured, Medicaid recipients, and racial/ethnic minorities. Although representing only 2% of acute care hospitals nationally, public hospitals provide 20% of the nation's uncompensated care (Zaman, Cummings, & Spielers, 2010). Urban public hospitals also provide key regional specialty services, including emergency, burn, and trauma care. However, the number of U.S. urban public hospitals is shrinking, with rates of closures and ownership changes outpacing those of their private sector counterparts (Needleman & Ko, In press). Limited evidence following outcomes of public hospital closures indicates that low-income residents experience increased barriers to care and worse health outcomes following closure (Bindman, Keane, & Lurie, 1990). The effects of privatization are less clear- case studies on non-profit conversions report no differences in access, whereas others have found that hospitals provide lower levels of uncompensated care after conversion to for-profit ownership (Bovbjerg, 2000; Legnini, Anthony, Wicks, Meyer, Rybowski, & Stepnick, 1999; Needleman, 1999).

Those who control public hospitals have cited a number of reasons for exiting the industry, including: the untenable fiscal strains for local governments, a shift in policy emphasis on outpatient care, and the desire for greater flexibility in hospital management and capital acquisition (Bovbjerg, 2000; Needleman & Ko, In press). However, regardless of the stated motivations to discontinue public hospital services, both administrators and observers have concluded that the final result is ultimately the product of a prolonged political process (Bovbjerg, 2000; Legnini et al., 1999; Savage, 2004). Managers of both thriving public hospital systems (such as Denver Health) as well as those that have successfully transitioned to private ownership (such as the Boston Medical Center), have noted the critical importance of working

with multiple stakeholder groups in order to maintain the hospital mission as a safety net provider (P. A. Gabow, 2001; Patricia A. Gabow & Mehler, 2011; Savage, 2004). The decision-making process regarding a public hospital often must accommodate the interests of the public, the local government, unions, community advocacy organizations, and private healthcare providers. As a result, the fate of the public hospital, whether public, private, or eventually closed, may depend upon the social capital of the community- the network of relationships that cross multiple social, professional, and political bounds.

Background

Social capital and health services

The process by which social relationships may be converted to economic and other resources was formalized by Bourdieu, who described the concept of social capital as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition or in other words, to membership in a group– which provides each of its members with the backing of the collectivity-owned capital” (Bourdieu, 2008). Bourdieu, Coleman and others in contemporary sociology focused on social capital as a resource that accrues to individuals, by virtue of their social networks (Portes, 1998). Sampson (et al) extended these concepts to neighborhoods, describing social capital as a community resource that facilitates collective efficacy, “shared expectations and mutual engagement by residents in local social control”(Sampson, 2003). In his work on the functioning of democracies, Putnam adapted concepts from sociology to describe social capital as a property of communities, states and nations: “all features of social life- networks, norms, and trust- that enable participants to act together more effectively to pursue

shared objectives”(Putnam, 1993). In this framework, community social capital promotes a greater interest in collective well-being, increased civic engagement, and ultimately, better governance (Putnam, 2000, Ch. 21, Democracy).

To date, the majority of health services research has examined the role of community social capital and individual access to care, with mixed results. Some studies have shown that community-level social capital was associated with fewer reported problems in access to care, greater odds of having a regular source of care, and increased use of mental health services (Drukker, Driessen, Krabbendam, & van Os, 2004; Greenberg & Rosenheck, 2003; Hendryx, Ahern, Lovrich, & McCurdy, 2002; Prentice, 2006). Other studies have found that community social capital is associated with fewer visits to a general practitioner and a higher number of preventable hospitalizations (Derose, 2008; Laporte, Nauenberg, & Shen, 2008). A few have noted that associations with outcomes varied by choice of social capital measure, area size, and age group (Derose, 2008; Laporte et al., 2008; Nauenberg, Laporte, & Shen, 2011; Prentice, 2006).

Almost no studies have addressed the relationships between community-level social capital and the healthcare system. Drawing upon Putnam’s original work, Veenstra et al applied a social capital framework to a case of healthcare governance, and found no relationship between community social capital and the performance of Canadian District Health Boards (Veenstra, 2002). In a study on private hospital behavior, Lee et al found that area-level participation in voluntary organizations was negatively associated with hospital provision of community health services (Lee, Chen, & Weiner, 2004). However, they also identified interaction effects, such that the combined effect of community representation on the hospital board and area-level voting rates, was positively associated with accountability and provision of community health services.

In their systematic review of the literature on social capital and health services, Derose and Varda contend that the lack of consistent findings may stem from the high degree of variability in both conceptual application and measurement of social capital (Derose & Varda, 2009). First, as initially identified by Portes in his criticism of Putnam's adaptation of social capital theory, there is often a failure to distinguish between the resources (social networks, social interactions) versus the products (reciprocity, trust) of social capital (Portes, 1998). For example, in their studies on access to care and trust in physicians, Ahern and Hendryx et al operationalized "general" social capital as a construct based upon crime (personal safety), voting rates (civic engagement), level of activity of fraternal orders based on number and size (community participation), annual per capita contributions to the United Way (reciprocity), and aggregated individual survey responses on trust in others and self-esteem (trust) (Ahern, 2003; Hendryx et al., 2002). When combined into a single measure, it is unclear whether the relationships between social capital and access to care arise from norms of trust and reciprocity, versus civic engagement and social networks. When studying only aspects of trust and reciprocity in relation to having a regular source of care, Prentice found no effect for neighborhood trust, a negative effect for neighbors doing favors, and a positive effect for neighbors' willingness to help each other (Prentice, 2006). In consideration of potential policy levers for public health, it may be more informative to address the resources –civic engagement and social networks- that characterize social capital, rather than the benefits (Woolcock, 2001).

Second, as a consequence of the first condition, Derose and Varda note that little agreement exists between studies as to the composition of social capital scales, and few have reported psychometric properties (Derose & Varda, 2009). In the study on performance of Canadian District Health Boards, Veenstra created a social capital index that combines the

provincial number of clubs and voluntary associations per capita (associational density), club participation rates (community participation), and voting rates (civic engagement) ($\alpha=0.841$) (Veenstra, 2002). Although all measures were used to create the index, the construct appears to be driven by associational density and voting rates, as the reported correlations between associational density and self-reported club participation measures were not robust ($\alpha=0.185$, $p=0.345$). Nevertheless, Veenstra found no relationship between the constructed social capital index and performance of district health boards. The conflicting findings of Lee et al, for community participation, vs. voting rates, on private hospital behavior, suggests that further investigation is needed prior to combining multiple measures of social capital into a single composite index (Lee et al., 2004).

Third, studies should differentiate between measures that aggregate individual responses to create community-level constructs of social capital, versus those that use direct community-level measures. Multiple studies have used aggregate survey data on individual participation in community activities to create measures of community social capital (Ahern, 2003; Hendryx et al., 2002; Lee et al., 2004; Prentice, 2006; Veenstra, 2002). However, Lochner et al argue that aggregation of individual responses results in an assessment of the compositional, rather than contextual, effects of social capital (Lochner, Kawachi, & Kennedy, 1999). In part to address this issue, Scheffler et al developed the Petris Social Capital Index (PSCI), comprised of measures on employment in voluntary organizations derived from the U.S. Census County Business Patterns database. These measures correspond to the Social Capital Community Benchmark Survey (SCCBS), which surveys individual respondents on community and civic participation (Petris Center, 2004). Recent studies have found that increased community social capital, as measured by PSCI, is associated with reduced general practitioner visits (Laporte et

al., 2008; Nauenberg et al., 2011). The authors concluded that community social capital may enable the development of community centers and other services, e.g. counseling, that reduce the need for primary care services. Use of community-level data may be most appropriate for studies of health policy, as these types of measures capture the existing networks that can potentially influence outcomes, e.g. through collective actions.

However, the PSCI fails to account for different types of social capital- bonding, bridging, and linking- generated by participation in various organizations. “Bonding” social capital arises from the interactions of homogenous groups, typically similar in race, ethnicity, education and income or other dimensions that comprise a “shared social identity”(Putnam, 2000; Szreter & Woolcock, 2004). “Bridging” social capital arises from relationships across heterogeneous groups, i.e. acquaintances, colleagues, and so on, who may be of similar social class but different backgrounds. In health services research, these distinctions should be made because the outcomes of social capital may vary by type. Whereas bonding social capital may facilitate social support for individuals, community bonding social capital may also increase the isolation of socially marginalized groups (Portes, 1998). Bridging social capital, by contrast, can create “linkage to external assets and...information diffusion...broader identities and reciprocity” (Putnam, 2000) (p.22). Subsequent researchers have cited the importance of linking social capital, “norms of respect and networks of trusting relationships between people who are interacting across explicit, formal or institutionalized power or authority gradients in society (Szreter & Woolcock, 2004).” Szreter and Woolcock thus describe bridging social capital as “horizontal,” connections among individuals of similar social status, and linking social capital as “vertical” connections among individuals of differing social status. Because public health necessarily involves populations, providers, and local governments, i.e. spanning multiple levels

of a local social hierarchy, Szreter and Woolcock argue that linking social capital is particularly salient to health services research.

Few studies have explicitly differentiated between bonding, bridging, and linking social capital. In one study that applied different constructs to represent these concepts, Derose found opposing associations between bonding, bridging and linking measures of social capital and preventable hospitalizations (Derose, 2008). For example, one measure of bonding social capital, commute time, and one measure of linking social capital, the density of faith-based organizations, were positively associated with the rate of non-elderly preventable hospitalizations, whereas one measure of bridging social capital, the probability of racial and ethnic interaction, was negatively associated. Derose and Varda conclude that researchers must consider differential effects of the types of social capital, in order to drive hypothesis generation and construct appropriate measures (Derose & Varda, 2009).

The purpose of this study is to examine the role of community social capital in the closure and privatization of U.S. metropolitan public hospitals. This work extends the small body of existing literature that addresses relationships between community social capital and healthcare systems. For conceptual clarity and application to policy, we address the effects of social networks and interactions, i.e. the resources, of social capital, rather than the benefits (trust, reciprocity norms). Furthermore, because public hospital status changes involve a broad range of community stakeholders, we focus our study on the effects of bridging and linking social capital, and select community-level measures that relate to these specific types. Our objective is to determine the effects of social ties across heterogeneous actors in the public hospital space, given that the final outcomes disproportionately impact the most vulnerable groups. Does community-level social capital affect local government responses that address the

needs of disadvantaged members of society, i.e. by either continuing public hospital services, or by fostering a conversion to private ownership, in order to maintain the facility?

Conceptual framework

We build upon a prior framework that elaborated relationships between community characteristics and public hospital outcomes (Figure 4.1). We consider multiple pathways through which community social capital may influence public hospital outcomes, through direct effects on the hospitals themselves, and indirect effects on local healthcare markets and the policy context.

Community social capital may have direct effects on public hospitals, via improved community health and access to ambulatory care. Social capital, particularly bridging social capital, is thought to contribute to health via information flows and transmission of positive health behaviors (Derose, 2008). Higher levels of community bridging and linking social capital are associated with better self-rated health, lower mortality rates, and higher health-related quality of life (Engström, Mattsson, Järleborg, & Hallqvist, 2008; Islam, Merlo, Kawachi, Lindström, Burström, & Gerdtham, 2006; Kawachi, Kennedy, Lochner, & ProthrowStith, 1997; Kim, Subramanian, & Kawachi, 2006; Mansyur, Amick, Harrist, & Franzini, 2008). As noted above, some studies have also found that community social capital is associated with improved access to outpatient care, or suggest that social capital results in access to alternative sources of care (Hendryx et al., 2002; Laporte et al., 2008; Nauenberg et al., 2011). Linking social capital may facilitate connections between patients and providers, and community social capital is also associated with increased trust in providers (Ahern, 2003; Szreter & Woolcock, 2004). Thus, public hospitals in communities with more robust social capital may experience reduced need for

services as a consequence of healthier communities, with better access to timely ambulatory care.

Community social capital may also affect local healthcare market competition for services. Bridging social capital may foster private hospital interest in community health promotion and care for disadvantaged populations. Linking social capital may further facilitate healthcare provider responsiveness to community health needs (Derose & Varda, 2009). As suggested by Lee et al, communities with greater social capital may have both an increased supply of community health services, as well as greater community service provision on the part of private hospitals when community representatives are involved in hospital boards (Lee et al., 2004). Thus, public hospitals in areas with greater community social capital may also experience greater competition from a private sector that is more willing to provide safety net services.

What distinguishes the case of public hospitals from their private counterparts, in relation to community social capital, is their compounded identity as local public policy. Thus, the theoretical concepts applying social capital to governance may be especially relevant. We anticipate that social capital will affect the local policy context for public hospitals in several ways. First, as bridging social capital may promote a greater interest in collective welfare, support for local government spending on health and welfare services for disadvantaged populations may increase (Putnam, 2000; Szreter & Woolcock, 2004). Second, linking social capital may contribute to higher levels of community engagement in policy oversight, with a concomitant response by local government, i.e. greater monitoring of hospital performance, and increased efforts to maintain quality of care and financial stability. Third, both bridging and linking social capital may strengthen networks between public hospital managers and other relevant parties, such as private healthcare providers, community advocacy organizations, and

unions. Therefore, by fostering public spending on health services, higher quality management, and community relations, greater area-level social capital would contribute to a more favorable policy context to sustain public hospitals.

Using a national sample of U.S. urban public hospitals, spanning the twenty-year period from 1987-2007, we examine relationships between measures of community social capital and public hospital closures and privatizations, controlling for hospital, healthcare market, and community sociodemographic characteristics. We assume that due to the inexorable rise in healthcare expenditures, all public hospitals have experienced considerable political pressures to ease the fiscal burden on local governments, through closure, privatization, or changes in management in order to stay public. Under these conditions, and based on this framework, we propose the following hypotheses regarding community social capital and public hospital outcomes:

- 1) *Community social capital is associated with a lower likelihood of closure over time.*

Public hospitals in areas with greater community social capital may experience a reduced need for services due to: a) improved population health; and b) greater participation from private sector providers who are engaged in providing safety net services. The result of these mechanisms is unclear. Public hospitals could benefit if these conditions merely reduce hospitals' burden of uncompensated care and improve their financial stability. Or, public hospitals could experience lower utilization and greater competition, thus supporting the argument that the local facility is not needed. However, we additionally propose that community social capital impacts the policy context for public hospitals, such that social capital fosters increased funding, political support, and oversight for public hospitals. Thus, we hypothesize that the

net impact of community social capital is to maintain the public hospital, as an alternative to closure.

- 2) *Community social capital is associated with a higher likelihood of privatization over time, relative to staying under public ownership.* As stated above, we assume that over time, urban public hospitals have considered whether to continue public ownership of the hospital or seek privatization (Needleman & Ko, In press). To the extent that social capital facilitates community interest in the well-being of disadvantaged populations, fosters private sector willingness to provide safety net services, and improves collaborations with community stakeholders, we anticipate that it will be easier for local governments to transfer healthcare responsibilities to a privately-owned entity.

Methods

Data sources

Data on hospital and market characteristics were obtained from the American Hospital Association (AHA) Annual Survey, which is administered each year to all U.S. hospitals and has an overall response rate of 90% (Thorpe, Florence, & Seiber, 2000). Additional data on hospital financial parameters were obtained from the Centers for Medicare and Medicaid annual hospital Cost Reports.

Data for county-level social capital constructs were derived from two sources. First, data on voluntary associations were obtained from the 2009 County Business Patterns database. The County Business Patterns database consists of annual county-level industry data compiled by the U.S. Census Bureau and includes information on number of establishments, employment, and

payroll. Second, data on voting patterns in federal presidential elections were derived from the 2010 USA Counties database, which contains election data supplied by the Congressional Quarterly Press.

U.S. Census Bureau data on population counts and local government revenues and expenditures were also derived from the 2010 USA Counties database. Measures of residential segregation were constructed from 1990 and 2000 U.S. Census tract-level data, extracted from the Neighborhood Change Database (Tatian, 2007).

Study Population

This study examines the population of urban U.S. nonfederal acute care, general medical and surgical hospitals located in metropolitan areas under public ownership in 1987, and observes outcomes to 2007. The AHA Survey dataset contains data on 143,829 hospital-year observations from the years 1984 to 2007. (Data are used from 1984 in order to include lagged variables for the years prior to 1987). From this set, the following exclusions were made: 2,246 observations from hospitals located in U.S. Associated Areas; 21,493 from long-term and subspecialty care hospitals; 58,661 from rural areas; 52,336 from hospitals under private or federal ownership in 1987; 2 duplicated observations; 1233 observations from 1984 to 1986 (prior to the start of the study period). Rural was defined as location in a non-Metropolitan Statistical Area at the study baseline, 1987. Following these exclusions, the baseline sample consisted of 415 acute care, general medical and surgical hospitals located in metropolitan areas in the 50 U.S. states under public nonfederal ownership in 1987, producing 7858 observations from 1987 to 2007. Of this set, 1736 observations occurred after the primary event of interest, closure or privatization, and were thus also removed from analyses. Following imputation

procedures for missing data (described below), the final analytic sample consisted of 6121 observations for analysis.

Measures

Dependent variables

Hospital closure was defined as discontinuation of any of the following, for a period of 5 or more years: inpatient care, acute care, or all operations. Hospital privatization was defined as a change in ownership from public to not-for-profit or for-profit status. Over the course of 20 years, hospitals may have experienced one or multiple ownership and operational status changes. For this study, to reduce complexity of analysis and maintain fidelity with the conceptual framework, outcomes are defined as the first event to occur, either closure or privatization.

Independent variables

Community social capital

In this study, we used two types of data to create measures of social capital: 1) associational density, the number of voluntary organizations per 10,000 residents in the county; 2) voting participation. Voluntary organizations represent networks of individuals around a common issue or goal, thus associational density is a proxy for the extent of these social networks (Veenstra, 2002)(Petris Center, 2004). From the County Business Patterns database, we obtained the number of organizations per county for the following types of associations: business, professional, political, religious, civic and social, and labor unions. Consistent with our conceptual framework, we focused on the types of associations that would facilitate bridging (horizontal ties across heterogeneous social groups) and linking (vertical ties across power or

authority gradients) social capital relevant to the public hospital space, and did not include measures typically assigned as bonding social capital. Furthermore, we assume that different types of organizations have the potential to generate different types of social capital. For example, labor unions represent a type of organization that fosters both bridging (between workers generally similar in status) and linking relationships across a power gradient (workers to management). In contrast, business and professional organizations may promote bridging social capital (managers and professionals across different sectors, but within the same power level).

From the USA Counties database, we obtained the percentage of residents aged 18 years and above who cast votes in presidential elections. Putnam characterizes voting rates as an indirect measure of bridging social capital, an indicator for general civic engagement and concern for collective well-being (Putnam, 2000)(p.35). However, others have conceptualized voting rates as a measure of linking social capital, as a direct indicator of the extent to which community members access power through the political process (Islam et al., 2006; Sundquist & Yang, 2007).

In order to create social capital constructs, we performed factor analysis on the above-listed measures. We used the principal components method of factor analysis and performed promax (oblique) rotation on the resultant factors. Two main factors were identified with eigenvalues greater than 1 and confirmed using the screeplot method (Afifi, May, & Clark, 2012). The first factor consists of loadings on business, professional and political associations per 10,000 capita, and the second factor consists of loadings on religious, labor, and civic associations per 10,000 capita (Table 4.1). These two factors accounted for 88.7% of the total variance. Based on these findings, two associational density scales were created: (1) the number of business, professional and political organizations per 10,000 residents; and (2) the number of

religious, labor and civic organizations per 10,000 residents. We broadly interpreted the first scale as a measure of bridging social capital, and the second scale as a measure of linking social capital. We designated the first scale as “bridging” social capital because it consists of organizations that could promote connections across racial/ethnic, income, and educational boundaries, but note that the participants are likely representative of relatively advantaged members of society. We designated the second scale as “linking” social capital because the associations represented, particularly faith-based and civic organizations, have been previously identified as promoting social networks across the status hierarchy (Derose & Varda, 2009). However, we recognize the potential for overlap in these constructs, as described in the example of labor unions above, and acknowledge that in the absence of detailed information about the specific organizations, these interpretations are only approximate assignments to social capital typologies.

In contrast to the findings by Veenstra, the correlation between voting participation rates was low with either scale ($r=0.062$ and $r=0.115$, for scales (1) and (2), respectively). Thus voting rates were treated as independent measures of civic participation, rather than incorporated into the scales. Because the measure was available only every four years, prior election values were carried forward until the next election year.

Community sociodemographic characteristics

Community socioeconomic status was measured by both the county median household income and the poverty rate, defined as the percentage of households with incomes below 100% of the Federal Poverty Level. Community racial and ethnic composition measures included the percentage of Black residents and the percentage of Hispanic residents. We also controlled for aggregate demand for hospital services with a measure for the total population in thousands.

Residential segregation was measured using the Dissimilarity Index (DI), which is interpreted as the proportion of minority residents who would have to move, in order to create an even distribution of minorities across the county (Massey & Denton, 1988). The DI ranges from 0, no segregation, to 1, complete segregation. We calculated the DIs for poor versus non-poor, Black versus non-Black, and Hispanic versus non-Hispanic, constructed from 1990 and 2000 Census tract and county data. Counties were then categorized into tertiles, with indicators for low (25th percentile), medium (25th-75th percentile), and high (75th percentile) levels of segregation. Values on community characteristics in 1990 were assigned to 1987 to 1999 data years. Values from 2000 were carried forward from 2000 to 2007.

Hospital and healthcare market characteristics

Hospital characteristics included bed size, teaching status², provision of advanced medical technology services³, and provision of unique specialty care services.⁴ We employed several variables to proxy for the performance of the hospital, including occupancy rate, log nurse-bed staffing ratio, hospital operating margins and whether the hospital had been accredited by the Joint Commission on Accreditation of Health Care Organizations (JCAHO). The payer mix was measured as the proportion of inpatient days each paid by Medicare and Medicaid.

Annual patient care operating margins were obtained from the Medicare Cost Reports.

The Herfindahl-Hirschman Index (HHI) for hospital beds within the county was used to estimate hospital market competition. We also employed a measure of the safety net role of the

² Teaching status was defined as a positive response for any of the following items: residency training approval by the Accreditation Council for Graduate Medical Education, medical school affiliation reported to the American Medical Association, or member of the Council of Teaching Hospitals Association of America.

³ The provision of high technology services was measured as a count of the following: extra-corporeal shock-wave lithotripsy, computed tomography scans, magnetic resonance imaging, positron emission tomography, diagnostic radioisotope, single photon emission computerized tomography, radiation therapy, and ultrasound [14].

⁴ Provision of unique specialty care services was measured by a dichotomous indicator for whether the hospital offered at least one of the following: neonatal intensive care, trauma, burn, or psychiatric emergency services.

hospital in a given market, calculated as the hospital's share of Medicaid inpatient care, relative to its overall market share of inpatient care in the county.

Because the process for status changes typically occurs over a prolonged period of time, we expect that hospital and market characteristics will be relevant for a period prior to the outcome, and estimated models using three-year lagged variables.

Policy context

Local government support was measured as per capita county revenues. Preference for spending on health and healthcare versus other types of government programs and services was measured by the proportion of county government expenditures allocated to hospitals and health care. Local revenues and expenditures data were also only available at 5-year intervals, and carried forward until the next assessed year. Hospital jurisdiction was measured by an indicator variable for whether the hospital is controlled at the city-county level, with district- and state-owned hospitals as the reference category.

Approximately 10% of hospital-year observations contained missing data on high technology, unique specialty, and operating margins. Missing values on hospital characteristics were imputed using multiple regression imputation with the ice procedure in Stata, and 20 replicate sets were created. (StataCorp, 2009a). Policy and sociodemographic contextual characteristics were not available on an annual basis and replaced with carry-forward values as described above. Because the County Business Patterns database represents a census of all counties, missing information for specific industries is considered equivalent to zero values ("County Business Patterns, About the data"). For example, a count with a missing value on number of professional organizations is considered to have zero organizations of this type.

Statistical Analysis

We used Cox proportional hazards regression models to estimate the effects of the independent variables on the log hazard of each outcome, closure or privatization. Conditions of the proportional hazards assumption were tested using scaled Schoenfeld residuals. Proportional hazards testing indicated that the effects of nurse-staffing ratios were not constant over time, and thus an interaction term with nurse staffing and year was included in the models.

Given our interest in examining two potential but mutually exclusive outcomes, we performed competing risks regression for closure vs. privatization, relative to remaining open and under public ownership. We performed two sets of regressions, the first for exit from the market by closure, with censoring of conversion as an alternative failure event, and the second with exit by privatization, with censoring of closed hospitals. The Efron method was used to handle tied event times, which can produce reliable estimates at large (greater than 200) sample sizes (Hertz-Picciotto & Rockhill, 1997). Because our data were discretized into annual observations, we also estimated models using discrete-time proportional hazard models to assess for differences based upon statistical method.

Public hospitals are particularly dependent on state-level policies, and thus we estimated models with state-level strata, a method which assumes that the parameter coefficients are equal, but each state has a unique baseline hazard function. We furthermore accounted for potential within-county correlation by using county-level clustered robust standard errors.

Stata 11 was used to perform all analyses (StataCorp, 2009b).

Results

In 1987, 415 acute care, general medical surgical metropolitan hospitals were under public, nonfederal ownership. Over the next 20 years, 40 hospitals closed and 156 converted to private ownership, with 219 remaining open and public for the entire period. Hospitals that

closed were located in areas with more organizations per 10,000 residents at baseline, but neither of these associations was significant in bivariate analyses. The county-level voting rate was higher in areas where a hospital closed, with marginal statistical significance ($p=0.055$) (Table 4.2). Hospitals that privatized were located in areas with lower voting rates and slightly lower associational density at baseline, but none of these factors was significant in bivariate analyses.

In multivariate analyses, community social capital factors became significantly associated with both outcomes after adjusting for hospital, healthcare market, and policy context measures (Table 4.3). However, the significant factors differed for closure versus privatization. Voting rates were associated with closure, whereas the bridging social capital scale was associated with privatization.

A one-percentage-point increase in area-level voting rates was associated with a 25.6% higher hazard of closure ($p<0.001$). Neither measure of associational density was associated with closure. Hospitals with a higher likelihood of closure over time were also located in areas with higher poverty rates, intermediate levels of poverty residential segregation, lower percentage of black residents, and intermediate black residential segregation. Hospitals in counties that had a higher proportion of expenditures for health and hospitals were also less likely to have closed during the study period.

A one-point increase in the number of business, professional and political organizations per 10,000 residents was associated with a 44.8% higher hazard of privatization ($p=0.011$), relative to remaining under public ownership. The number of religious, civic and social, and labor organizations was not significantly associated with privatization. Hospitals with a higher hazard of privatization were also located in areas with higher Hispanic residential segregation, but the effects of other measures related to area-level socioeconomic status, including poverty

and household income, were not significant. County jurisdiction was associated with a higher hazard of privatization, and per capita county revenues were marginally associated with a lower hazard of privatization.

Discussion

The findings from this study lend support to the concept that community social context affects the decision-making process in complex pathways for urban public hospitals.

Nevertheless, our findings do not support the proposition that community social capital offers a means by which disadvantaged groups may influence local governance in response to community needs. Szreter and Woolcock specifically focus on linking social capital as a mechanism by which poor communities gain access to resources such as healthcare, but our measure of linking social capital was not associated with either outcome, closure or privatization. Instead, our other measures of community social capital were positively associated with discontinuation of public hospital services. Furthermore, our findings confirm prior research which has shown differential community-level influences on public hospital closures versus privatizations (Chapter 3).

Our first finding, the positive association between voting rates and public hospital closures, was unexpected and could be explained by two competing scenarios. First, community social capital may foster private sector participation in safety net services and thus diminish the need for a separate, publicly-funded hospital. Social capital would increase a sense of collective responsibility for disadvantaged populations and these social norms could be adopted by the communities' private healthcare institutions. This is consistent with the findings of Lee et al, in which the combined effects of voting rates and community board participation were associated with increased provision of community health services by private hospitals (Lee et al., 2004).

Under this rationale, we might have also expected that the hospital's relative share of Medicaid care would be negatively associated with closure- that the hospital closes because it did not disproportionately provide safety net services – but our findings show an opposite effect.⁵ Furthermore, if voting rates are considered a form of linking social capital via the act of political participation, the findings would imply that all groups across the social hierarchy, including the most disadvantaged, favor closure of the public hospital and communicate these interests via civic engagement. Given the opposition historically expressed by minority and poor communities in response to proposed closures, this position seems unlikely (Offner, 2001).

A competing explanation for our unexpected findings hinges upon whether area-level voting rates should be interpreted as a typical measure of bridging or linking social capital in this context. In the counties represented by our sample, voting rates were not correlated with the other social capital measures on voluntary organizations, which more directly assess social participation. Other research has found that voting participation is associated with older age and higher levels of education and income—populations that are less likely to utilize public hospital services (Milligan, Moretti, & Oreopoulos, 2004). Therefore, voting rates may correspond to increased civic engagement of relatively more affluent citizens- a consequence of bonding social capital of higher status groups. Bourdieu, and later both Putnam and Szreter cautioned the extent to which social capital among the elites could be used to perpetuate structural disadvantage (Bourdieu, 2008; Putnam, 2000; Szreter & Woolcock, 2004). Those who control public hospitals have reported a diminishing political interest over the past several decades to fund safety net services through local tax revenues (Needleman & Ko, In press). When faced with competing demands for public funds, a community with greater civic participation of the

⁵ Area-level voting rates were minimally correlated with the hospital safety net index in the sample ($r=-0.071$).

relatively privileged may favor allocation of resources to other types of public services from which they would benefit, such as public safety.

Our findings regarding privatization are also consistent with the conclusion that public hospital outcomes may be more significantly affected by the social capital of the elite members of society. In contrast to closure, conversion of a public hospital to private ownership requires greater participation from the private sector in order to identify an entity willing to assume responsibility of hospital operations. Case studies of public hospital privatizations have repeatedly documented the importance of engagement of multiple stakeholder groups in order to transition to private ownership status (Bovbjerg, 2000; Legnini et al., 1999; Savage, 2004). One explanation for the relationship between business, professional and political associational density, and hospital privatization, may be that this measure reflects the resources of the types of community associations that are particularly beneficial to foster these negotiations. Our lack of findings for our linking social capital measure suggests that the horizontal relationships between relatively powerful groups bears more influence on outcomes than the cross-cutting relationships that would link the disadvantaged (e.g. those who utilize public hospital services) with those in positions of power.

This study does not address whether the outcomes, particularly privatization, result in maintenance of safety net services for disadvantaged populations. Directions for future research include investigations into whether bridging and linking social capital result in greater provision of safety net services by private hospitals. If the trend in the decline of the public hospital sector continues, it would be important for policymakers to understand what community factors may facilitate access to care in the absence of a public provider of last resort.

Limitations

First, our measures were limited to those consistently available for a national sample over the period from 1987-2007. Thus, we were unable to utilize more detailed measures of social capital related to social participation and social networks. For example, our analyses included a broad measure of unionization, number of unions per capita, rather than the percentage of the population that was unionized or type of union. Prior case studies have cited the influence of healthcare worker unions, and in their study on California public hospitals, Graddy and Ye found the degree of local public sector unionization was negatively associated with public hospital termination (by either closure or privatization) (Graddy & Ye, 2008; Savage, 2004). Additional investigation is needed to elucidate the role of healthcare worker unions, and to what degree the unions' interests are aligned with the public hospital patient population.

Second, our measure of voting rates applies to federal presidential elections, not specifically to civic engagement in local affairs. However, it seems unlikely that communities with higher levels of civic participation in local affairs would be less inclined to vote in presidential elections; prior research has found municipal and federal voter turnout to be positively correlated (Hajnal & Lewis, 2003). Furthermore, federal, rather than local, election participation may be a more appropriate measure. Local voting rates as a measure of social capital may be conflated by the relationships between local elections and policy decisions for public hospitals—i.e., local voting in a given election may be increased if the voters perceive an immediate consequence of the election, e.g. closure of the public hospital. We were unable to observe whether voting rates of specific subgroups, defined by age, race and socioeconomic status, drive the association between voting and public hospital closure. We were also unable to measure participation rates of other types of civic participation, particularly the types of activities

Putnam describes as “cooperative” such as serving on committees, which he argues are more constructive to accommodating broader interests (Putnam, 2000) (p.45). To the extent that we expect voting rates are correlated with other types of civic activities, we believe we have captured some effects of civic engagement but are unable to conclusively attribute these effects to a specific segment of the community.

Third, we chose to study the first event to occur, either privatization or closure, and thus our interpretations are limited to factors affecting the initial decision process, not the final disposition of the hospital. However, of the 196 hospitals that experienced closures and privatizations, the vast majority (165) remained unchanged by the end of the study period.

Fourth, we used the county as the geographic unit of analysis, and the heterogeneity of U.S. counties may bias community contextual effects towards zero. In contrast to private hospitals, public hospitals have mandated service areas that correspond to a political jurisdiction; in this population, 87% of the hospitals were under city, county, or hospital district jurisdiction. Interpretation of contextual effects are limited in recognition that use of the county inherently involves an approximation, rather than a directly corresponding measure (e.g. voting rates reflect general civic engagement, rather than the presumed representational behavior of the hospital’s specific electorate).

Conclusion

Political science applications of social capital have argued for a role of social capital in local governance, whereas health services research has primarily explored the effects of social capital on individual access to care. Our study suggests that the effects of social capital on the healthcare system, and in particular, the healthcare safety net, are varied, and may be dependent

not only on the strength of ties, but on the social networks of the advantaged groups rather than the disadvantaged populations who actually receive safety net services.

Figure 4.1. Conceptual framework for relationships between community social capital, policy context, healthcare market, hospitals characteristics, and eventual decisions to close or privatize public hospitals.

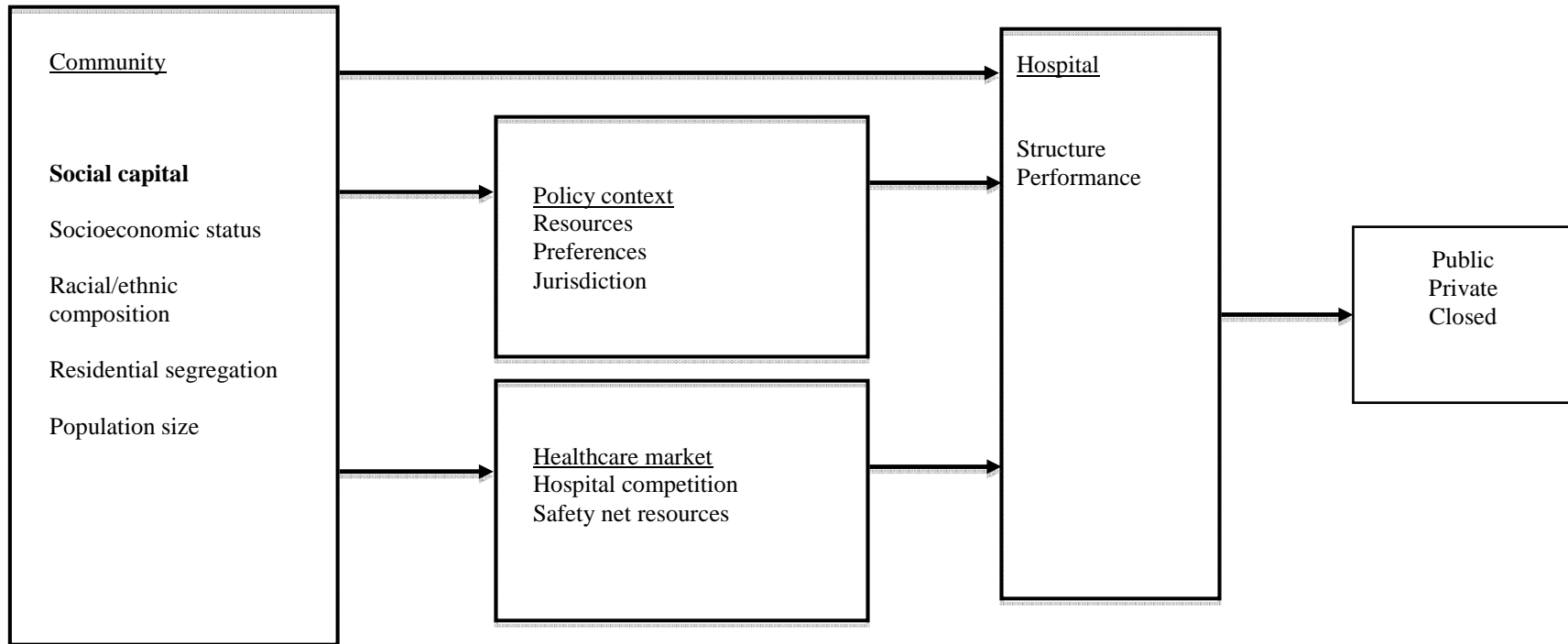


Table 4.1. Factor analysis of associational density variables. Each variable consists of the number of organizations per 10,000 residents per county.

Industry	Factor 1	Factor 2
Business	0.968	-0.006
Professional	0.991	-0.095
Political	0.877	0.102
Religious	-0.220	0.886
Labor	0.182	0.686
Civic	0.148	0.774
Eigenvalue	3.058	2.260
Proportion of total variance	0.510	0.377

Table 4.2. Baseline community characteristics of U.S. metropolitan public hospitals, 1987, by subsequent hospital ownership/operational status. (N=6121). Mean (SD) reported for continuous variables and proportion (frequency) for categorical variables. †p<0.1; *p<0.05; **p<0.01; ***p<0.001

	All (N=415)		Public (N=219)		Closed (N=40)		Private (N=156)	
Community social capital								
Number of business/professional/political organizations per 10,000 residents	0.77	(0.82)	0.77	(0.66)	0.91	(1.70)	0.74	(0.67)
Number of religious/civic/labor organizations per 10,000 residents	7.88	(2.99)	7.65	(3.01)	7.84	(2.75)	8.21	(3.01)
% Voting in most recent presidential election	56.31	(8.44)	56.34	(8.50)	57.47 † ^a	(8.23)	55.99	(8.44)
Community sociodemographics								
%Poor	13.64	(5.53)	13.90	(5.56)	13.91	(5.71)	13.20	(5.45)
Poverty Dissimilarity Index	0.31	(0.10)	0.31	(0.10)	0.32	(0.10)	0.31	(0.11)
%Black	12.86	(12.58)	13.39	(12.12)	9.64	(12.88)	12.96	(13.09)
Black Dissimilarity Index	0.53	(0.20)	0.54	(0.24)	0.53	(0.15)	0.52	(0.15)
%Hispanic	8.99	(12.83)	9.84	(13.04)	11.91	(14.26)	7.05	(11.91)
Hispanic Dissimilarity Index	0.35	(0.11)	0.34	(0.12)	0.37	(0.13)	0.35	(0.10)
Median household income	27.41	(5.36)	27.30	(5.14)	27.98	(5.35)	27.41	(5.69)
Total population	642.32	(1238.54)	710.30	(1303.47)	820.87	(1813.29)	501.10	(919.48)

^aAssociations between social capital factors and outcomes are adjusted for total population size.

Table 4.3. Competing hazards models of associations between community social capital and time to first closure or privatization of public hospitals from 1987-2007. N= 6121 hospital-year observations. Hazard ratios indicate relative effects of predictors on annual rates of closure and privatization. . †p<0.1; *p<0.05; **p<0.01; ***p<0.001.

	Closure HR	95% CI	Privatization HR	95% CI
Community social capital				
No. business/professional/political organizations per 10,000 residents	1.145	(0.208 -6.303)	1.448*	(1.087 -1.927)
Number of religious/civic/labor organizations per 10,000 residents	1.074	(0.726 -1.589)	0.956	(0.855 -1.069)
% Voting in most recent presidential election	1.256***	(1.100 -1.434)	1.012	(0.977 -1.048)
Community sociodemographics				
% Poor	1.230*	(1.014 -1.492)	1.052	(0.975 -1.134)
Poverty DI (Low)	0.063**	(0.010 -0.385)	1.254	(0.732 -2.145)
Poverty DI (High)	0.228†	(0.050 -1.041)	1.224	(0.765 -1.957)
% Black	0.911*	(0.830 -0.999)	1.011	(0.984 -1.039)
Black DI (Medium)	0.200**	(0.055 -0.726)	0.715	(0.444 -1.150)
Black DI (High)	0.633	(0.125 -3.208)	0.641	(0.337 -1.217)
% Hispanic	1.044	(0.963 -1.132)	0.984	(0.945 -1.025)
Hispanic DI (Medium)	0.528	(0.128 -2.184)	2.203**	(1.288 -3.768)
Hispanic DI (High)	0.365	(0.049 -2.729)	2.081*	(1.089 -3.978)
Median household income	0.952	(0.844 -1.073)	1.021	(0.978 -1.068)
Total population	1.000**	(1.000 -1.001)	1.000	(1.000 -1.000)
Hospital				
Bed size	0.999	(0.995 -1.003)	1.000	(0.999 -1.001)
Teaching	0.916	(0.246 -3.410)	0.303**	(0.154 -0.596)
High technology services	0.534**	(0.350 -0.815)	1.000	(0.860 -1.163)
Log nurse staffing ratio	0.028***	(0.004 -0.206)	2.544*	(1.218 -5.312)
Log nurse staffing ratio * year	1.466***	(1.189 -1.811)	0.943	(0.883 -1.008)
Occupancy rate	0.953**	(0.916 -0.991)	0.994	(0.982 -1.007)
% Medicare	1.124**	(1.033 -1.223)	0.999	(0.984 -1.014)
% Medicaid	1.055*	(1.002 -1.111)	0.984	(0.961 -1.007)
Operating margins	2.075	(0.700 -6.147)	0.903	(0.789 -1.007)

	JCAHO accreditation	0.259*	(0.087 -0.772)	1.403	(0.731 -2.694)
Market					
	HHI	1.381	(0.054 -35.425)	0.489	(0.190 -1.258)
	Safety net index	3.503**	(1.491 -8.227)	0.908	(0.629 -1.310)
Policy context					
	% government expenditures on health and hospitals	0.875**	(0.808 -0.948)	0.999	(0.976 -1.023)
	Revenue per capita	0.934	(0.669 -1.303)	0.635†	(0.401 -1.005)
	County/City governance	3.614	(0.780 -16.756)	1.523*	(1.010 -2.298)

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CHAPTER 5: Conclusion

This dissertation advances the existing literature on community social context and the implications for health services for disadvantaged populations. The three papers suggest mechanisms by which processes of social stratification may be related to the local supply of safety net providers in urban areas.

The first paper, titled, “Community residential segregation and the local supply of Federally Qualified Health Centers,” addressed the relationships between community residential segregation by income and race/ethnicity, and growth in FQHCs in metropolitan U.S. counties. This study found that counties with a high non-White dissimilarity index and a high percentage of minorities were more likely to have an FQHC in 2000. The effects of both poverty and non-White dissimilarity indices were positive and significant on the addition of new FQHCs from 2000 to 2007. These results are consistent with prior research that has proposed that residential segregation produces geographic segregation of health services. The gaps arising from provider maldistribution may then explain the association between residential segregation and FQHC supply. The findings highlight how urban planning and development policies may translate to downstream effects in health services. Furthermore, the independent effects of racial/ethnic contextual factors suggests persistent disparities in absence of policies to diversify workforce.

The second paper, “Residential segregation and the survival of U.S. urban public hospitals,” explored the effects of similar predictors on a second set of outcomes, urban public hospital closures and privatizations. When controlling for the other covariates in the model, hospitals in areas with high poverty rates and intermediate poverty segregation were more likely to close, whereas hospitals in communities with a high proportion of black residents and black

residential segregation were less likely to close. The finding for high-poverty communities suggests that those areas with a high need for safety net services may also be most likely to lose them. On the other hand, the findings regarding community racial contextual factors suggest that more segregated urban black communities may be more successful at advocating for maintenance of public hospitals. In contrast to the findings for closure, relatively few variables were associated with hazards of privatization. Public hospitals in areas with higher levels of Hispanic residential segregation were more likely to convert to private ownership, controlling for other factors in the model. Areas with segregated Hispanic communities may be less inclined to support public provision of services, particularly if Hispanics are perceived to disproportionately benefit from those services, and both Hispanic segregation and the lowered consequences of conversion (e.g., continued services) may reduce community opposition to privatization. Recent research has found that the likelihood of physician shortage increases with black, but not Hispanic, residential segregation, suggesting also that Hispanic communities may have fewer barriers to care related to segregation (Gaskin, Dinwiddie, Chan, & McCleary, 2012).

The findings of the first two papers together provide evidence for social contextual effects on safety net supply, net of other demographic and healthcare market factors. The positive relationship between poverty rates and FQHCs suggests that federal policies are aligned to address geographic disparities in access to primary care. In contrast, the positive relationship between poverty and public hospital closures highlights the vulnerabilities of public hospitals and suggests that in the absence of state or federal involvement, the dependence on local economic conditions may exacerbate disparities. The positive relationships between community racial/ethnic composition and both outcomes suggests that safety net providers are

needed to counter persistent gaps in access related to area-level racial and ethnic community context, net of socioeconomic factors.

The findings for residential segregation in both papers indicate an independent relationship for the distribution of disadvantaged populations beyond the aggregate composition. The combined findings may be explained by several potential mechanisms. First, that residential segregation contributes to geographic segregation of healthcare services, such that both hospitals and primary care providers are not evenly distributed across communities. In turn, communities with higher levels of segregation thus may require a greater supply of safety net services to offset disparities related to maldistribution of providers (Gaskin et al., 2012). Second, racial (but not income) residential segregation may promote community organizing and advocacy efforts necessary to support safety net providers (e.g. fundraising for community health centers, or political activism to resist hospital closures).

Both sociology and political science theories have proposed that residential segregation may lead to social inequalities through community social capital (Putnam, 2000; Sampson, 2003). In the first mechanism described in the preceding paragraph, residential segregation would promote the isolation of disadvantaged groups, thus reducing the potential for bridging and linking community social capital to healthcare providers. In addition, residential segregation may lead to increased bonding social capital of higher social strata, thus increasing the tendency to disproportionately offer healthcare resources to more advantaged populations. These social capital explanations would appear counter to the second mechanism – by which residential segregation may facilitate actions on the part of minority community members to advocate for safety net services-i.e. suggesting that bonding, bridging and linking social capital may be facilitated, not hampered, by residential segregation. However, the findings of the first two

papers imply that a more nuanced view of the relationships between residential segregation and social capital may be needed. Residential segregation may foster beneficial social relationships for isolated minority communities- but perhaps more so in response to the larger barriers in access to care perpetuated by residential segregation.

The third paper addressed the issue of community social capital in relation to safety net providers using the same sample of urban public hospitals from the second paper.

Unexpectedly, the third paper found that rates of voter participation were positively associated with public hospital closure over time, whereas one measure of bridging social capital among social elites was positively associated with privatization. There was no association between linking social capital and either outcome. The findings suggest that horizontal forms of social capital among more privileged groups bear more influence on public hospital outcomes than vertical connections between disadvantaged groups (i.e., those who utilize public hospital services) those in power. Of note, the third paper examined social capital broadly, as social networks across urban areas, not the social capital specific to segregated communities. In other words, the social capital measures of the third paper should not be considered mediators of the effects of residential segregation demonstrated in the second paper. Instead, these measures may reflect potential parallel mechanisms that all participate in the generation of social capital- residential segregation, civic participation, and associational behavior.

When taken together, the combined results of all three papers imply that the social capital of the elites, rather than the social capital of the most vulnerable, bears greater net significance in regards to access to care for disadvantaged populations. This interpretation is consistent with the original concerns regarding social capital as expressed by Bourdieu, who perceived social capital as a means by which privileged groups may perpetuate structural inequalities (Bourdieu, 2008).

The future of the safety net infrastructure may become increasingly dependent on the actions, connections, and preferences of local elites. Political support for local public funding of healthcare safety net services has continued to decline, and these trends may be accelerated by ongoing county and municipal budget crises in the fallout of the economic recession of 2007. More recent calls for federal fiscal austerity may reduce resources that have been critical to maintaining safety net services when local resources have dwindled. For example, Disproportionate Share Hospital funding mechanisms have been critical in order to balance reductions in local revenue supports (Bazzoli, Kang, Hasnain-Wynia, & Lindrooth, 2005). Although politically popular, community health centers have also experienced substantial cutbacks in the federal funds originally legislated to expand and create new centers (Weintraub, 2011).

The findings of this dissertation demonstrate that social determinants dictate both the need and societal response for the safety net. Directions for future research include greater exploration of the role of public-private, as well as all-private, partnerships in the healthcare safety net. What context facilitates the success of some community health centers versus others? What are the characteristics of communities that develop meaningful processes to ensure access to care following closure or conversion of a public hospital? Another potential line of inquiry would explore what factors engender a sense of responsibility on the part of more privileged groups to ensure access to care for disadvantaged populations in the absence of public institutions or policies. The bulk of safety net care is not provided by formally designated institutions, such as public hospitals and community health centers, but is instead furnished by private providers. In the context of increasing consolidation in the healthcare market, what community characteristics would encourage larger healthcare organizations to maintain a societal

obligation to provide safety net services? Although one aspect of social stratification, residential segregation, appears to be decreasing in the United States, other factors, including overall income inequality, as well as racial and ethnic income and wealth inequality, are rising. Without broad changes in health and social welfare policy, disparities in health and access to care are likely to persist, and continue to require safety net providers to attempt to fill the gaps. However, the findings regarding social capital suggest that even safety net providers may be influenced by local social structure in ways that may or may not serve the interests of the most disadvantaged. Federal policymakers should be made cognizant that upstream interventions that reduce structural inequalities may not only lessen the need for safety net services, but also limit the extent to which the distribution of these resources may be influenced by those unlikely to use them.

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