Availability of Safety Net Providers and Access to Care of Uninsured Persons

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Objective. To understand how proximity to safety net clinics and hospitals affects a variety of measures of access to care and service use by uninsured persons.

Data Sources. The 1998–1999 Community Tracking Study household survey, administered primarily by telephone survey to households in 60 randomly selected communities, linked to data on community health centers, other free clinics, and safety net hospitals.

Study Design. Instrumental variable estimation of multivariate regression models of several measures of access to care (having a usual source of care, unmet or delayed medical care needs, ambulatory service use, and overnight hospital stays) against endogenous measures of distances to the nearest community health center and safety net hospital, controlling for characteristics of uninsured persons and other area characteristics that are related to access to care. The models are estimated with data from a nationally representative sample of uninsured people.

Principal Findings. Shorter distances to the nearest safety net providers increase access to care for uninsured persons. Failure to account for the endogeneity of distance to safety net providers on access to care generally leads to finding little or no safety net effects on access.

Conclusions. Closer proximity to the safety net increases access to care for uninsured persons. However, the improvements in access to care are relatively small compared with similar measures of access to care for insured persons. Modest expansion of the safety net is unlikely to provide a full substitute for insurance coverage expansions.

Key Words. Safety net, community health centers, access to care, uninsured

Although studies have consistently shown that uninsured persons have lower access to care than people with insurance coverage (Hadley 2003; Institute of Medicine 2002), uninsured persons can often obtain health services from providers who treat patients regardless of their ability to pay. Commonly referred to as "the health care safety net," these providers are a mix of public hospitals and publicly supported community health centers (CHCs), as well as some private hospitals and other health care providers that serve a disproportionate number of uninsured (Institute of Medicine 2000). Despite substantial federal financial support for the safety net through Medicare and Medicaid disproportionate share payments to hospitals and the Community Health Center program (Hadley and Holahan 2003; U.S. Department of

Health and Human Services 2003), very little is known about the extent to which the safety net improves access to care for the uninsured.

This study fills a critical gap in our knowledge by examining the effects of the safety net on access to care of uninsured persons. We do this by linking data on a variety of different types of safety net providers to the 1998–1999 Community Tracking Study (CTS) household survey, a nationally representative survey that includes a large number of uninsured persons. We measure safety net availability in terms of the distances to the nearest safety net providers and then assess the effects of distance to safety net providers on several measures of access to care by uninsured persons.

Literature Review

Previous research has shown substantial variation across the nation in access to care among uninsured and low-income populations (Cunningham and Kemper 1998; Long and Marquis 1999; Zuckerman, Haley, and Holahan 2000). While these studies cite differences in safety net availability as a likely explanation for geographic variations in access, they have not demonstrated an explicit link between safety net availability in a geographic area and the level of access to care for uninsured persons, in large part because of the difficulties in measuring safety net availability.

Some studies have examined the effects of specific types of safety net providers, such as public hospitals, on access to care (Thorpe and Brecher 1987; Bindman, Keane, and Lurie 1990). There are considerably more studies examining the effects of community health centers on access to care. (See Politzer et al. 2001; Dievler and Giovannini 1998; and Blumenthal, Mort, and Edwards 1995 for reviews of research on the effects of CHCs.) Several early studies found evidence of reduced emergency room use and a sizable shift of care out of hospitals after CHCs had opened (Okada and Wan 1980; Freeman, Kiecolt, and Allen 1982). More recently, Epstein (2001) found that areas with CHCs tended to have lower rates of preventable hospitalizations. Other

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studies have provided evidence of increased access and service use, reduced use of hospitals, and better health outcomes among users of CHCs, but not among uninsured people more generally.

All the studies cited above have significant limitations. First, some analyze indirect measures of access, such as uncompensated care or preventable hospitalizations in a community, rather than uninsured individuals' assessments of their access. While suggestive of access problems, they do not show how the safety net directly affects access in the population most likely to depend on these providers. Second, many studies are based on a single or small number of communities or states, making it difficult to generalize to the nation. A third difficulty is defining the geographic area served by the safety net. The effects of the safety net on access could be understated if the geographic unit of measurement is a relatively large area, such as a state, Metropolitan Statistical Area (MSA), or even a county, which vary considerably in terms of their size and population concentrations, and intra-area safety net availability.

Finally and most importantly, much of the previous research may be subject to two major sources of bias: selection bias and endogeneity bias. Selection bias refers to the fact that many of the previous studies are limited to people who actually use CHCs, omitting those who either do not use CHCs or do not use any health care at all. This type of selection bias limits generalizability, since the results do not show whether CHCs increase access for people who otherwise would not have received any medical care.

Endogeneity bias arises because the geographic distribution of safety net providers is not random. Since designation as a medically underserved area is frequently a criterion for the location of safety net providers, factors affecting safety net providers location may confound the effects of safety net availability on access to care of people living in these areas. In addition, uninsured and low-income people may choose to live near a safety net provider, precisely because they have poor access to other providers. In other words, if the presence of safety net providers in an area is partially the *result* of poor access in that area, then failure to account for the effects of this reverse causation may seriously confound the results of prior studies.

Data and Methods

Data Sources

Uninsured People and Characteristics. The primary data source for this study is the 1998–1999 Community Tracking Study (CTS) household survey, which

collected data in 60 randomly selected and nationally representative communities (Metcalf et al. 1996; Strouse et al. 1998). The sample was obtained through random digit dialing, supplemented by in-person interviews in order to represent households without telephones. The sample for the 60 CTS sites is approximately 55,000 persons. A series of detailed questions about insurance coverage is used to identify 6,248 nonelderly uninsured persons who are the sample for this analysis. The survey obtains information on socioeconomic and demographic characteristics, and several widely used measures of access to care.

Safety Net Providers. Safety net providers include public hospitals, private hospitals that perform a safety net function, Federally Qualified Health Centers (FQHCs), FQHC "look-alike" facilities, and other free clinics that do not receive federal grants. Safety net hospitals (SNHs), which were identified from the 1998 American Hospital Association public use file (American Hospital Association 1999), include all nonfederal public hospitals and a select number of private, not-for-profit hospitals that appear to serve a safety net function. Since the amount of care provided to uninsured patients is often correlated with having a large volume of Medicaid patients, we define private safety net hospitals as hospitals with a high Medicaid caseload, that is, a Medicaid caseload greater than or equal to one standard deviation above the mean for private, not-for-profit hospitals in each state (Gaskin, Hadley, and Freeman 2001).

Information on FQHCs was obtained from a directory published by the Bureau of Primary Health Care (1998). These include community and migrant health centers, health care for the homeless programs, and public housing programs that receive direct federal grants for health services. "Look-alike" facilities that meet the statutory requirements of the FQHC program but do not receive direct federal grants are also included. School-based clinics and clinics that provide only dental care are not included. Information on other free clinics that neither receive federal grants nor meet the statutory requirements of the FQHC program was obtained from a directory published by the Free Clinic Foundation of America (2000). Other providers that sometimes perform a safety net function, such as local health departments and office-based physicians, were not included because data to compute measures of distance for household survey respondents (see below) are not available for these providers.[1]

Other Area Characteristics. The multivariate analysis includes several area characteristics. The number of medical school faculty in a county was obtained from the Association of American Medical Colleges roster of medical schools and faculty size. County data on voting patterns in 1992 and 1996 was

obtained from the Area Resource File. The Urban Institute's Assessing the New Federalism state database provided information on states' AFDC payment levels. We also used information in preliminary analysis on the number of physicians relative to population by five-digit zip code, which was tabulated from the American Medical Association's physician masterfile.

Conceptual Framework

The economic theory of the demand for medical care guides the conceptual framework and specification of the multivariate model. This framework assumes that the demand for medical care depends on out-of-pocket money costs and time/convenience costs of obtaining care, and on factors that generally influence whether people need and try to obtain medical care, such as health, age, gender, family structure, income, education, race, ethnicity, and attitudes toward risk.

Out-of-pocket money costs and time/convenience costs depend on insurance coverage and the proximity or distance to various medical care providers. We eliminate the former as a direct consideration in the analysis by limiting our sample to people who are uninsured.[2] Thus, distances to the nearest safety net providers, either a community health center (CHC) or a safety net hospital (SNH), are hypothesized to affect both out-of-pocket money cost, since safety net providers are more likely than other providers to deliver care either for free or at reduced price, and time/convenience costs. In effect, the model hypothesizes that the shorter the distance between an uninsured person and a safety net provider, the greater the level of access to care.

Measuring Distance to the Nearest Safety Net Provider

Distances between safety net providers and CTS household survey respondents were calculated from the latitudes and longitudes of providers' and respondents' five-digit zip code centroids.[3] Distances (in miles) to the nearest SNH and CHC were computed for each person in the CTS household survey. Persons living in a zip code with a safety net provider are coded as "0" on the distance measures.

Multivariate Analysis—Dependent Variables: Measures of Access to Care

We use three sets of indicators of access to care as the dependent variables. The first set measures whether the person reports having a usual source of care and, if they do, whether the source is a freestanding health center or a hospital outpatient department. The second pair of variables measures lack of access, that is,

whether the person reported having an unmet medical need or having delayed in seeking needed medical care any time in the prior year. The third set looks at actual service use: whether in the last year the person had any ambulatory visit, an emergency room visit, a general medical visit, or a hospital stay.

Multivariate Analysis—Independent Variables

The key independent variables are the distances to the nearest CHC (of any type) and to the nearest SNH. We distinguish between these two types of safety net providers because they may have different missions and different functions. CHCs generally have a strong primary care and prevention orientation and may focus on a particular population, such as pregnant women, children, or homeless people, while SNHs play a more important role in providing emergency care, as well as primary and specialty care to all people.

Other independent variables, which we use to control for differences in need and predisposing factors, are gender, race (African American, Hispanic, or other race relative to whites), self-reported health status (excellent/very good, or good health, relative to fair or poor health), attitude towards risk (whether the person is a strong or moderate risk taker, relative to a person who is unlikely to take risks), marital and family status, whether the interview was conducted in Spanish, the person's age, education, annual family income, and type of community (small metropolitan county or rural county, relative to a large metropolitan county).[4]

Instrumental Variable (IV) Statistical Estimation

If the distances between safety net providers and uninsured people are influenced by the uninsured's level of access in a population or if there are unobserved factors that influence both access and safety net provider location, then using ordinary least squares (OLS) regression analysis to estimate the effects of distance on access will produce biased results because the distance measures will be correlated with the model's error term. We use instrumental variable (IV) estimation to address this potential source of bias (McClellan and Newhouse 2000).

Although unobservable factors are, by definition, unobservable, comparing observable characteristics of uninsured people who live various distances from the nearest safety net provider indicates that there are substantial differences in these populations (Table 1). Compared to people living more than five miles from a safety net provider, uninsured people living within one mile of a safety net provider are less well educated, are in poorer health, and

Table 1: Selected Characteristics of Uninsured People, by Distance to Nearest Safety Net Provider (CHC or SNH)

	Distance to Nearest Safety Net Providers			
	Less than 1 Mile	*1–5 Miles*	*5–10 Miles*	*More than 10 miles*
Any usual source of care (%)	52.9	58.3[a]	57.6[a]	67.0[a]
Education less than 9 years (%)	18.7	13.1[a]	10.1[a]	7.2[a]
Race and ethnicity				
White (%)	31.8	43.3[a]	64.1[a]	77.2[a]
African American (%)	16.8	22.0[b]	15.9	6.5[a]
Hispanic (%)	44.4	29.4[a]	17.4[a]	12.8[a]
Interviewed in Spanish (%)	33.6	21.6[a]	9.0[a]	8.3[a]
Health status				
Excellent or very good (%)	53.9	56.2	62.9[a]	62.2[a]
Fair or poor (%)	19.8	18.0	13.7[a]	14.2[a]

[a]Significantly different from nearest group, $p<0.05$;
[b]Significantly different from nearest group, $p<0.10$.

are much more likely to be racial and ethnic minorities. Moreover, uninsured people living closest to a safety net provider are least likely to report having a usual source of care.

These comparisons suggest that observed factors associated with poor access to care are also associated with close proximity to a safety net provider. In addition, given the extent of these observed differences, it seems likely that unobserved differences in, for example, culture or familiarity with the private health care system, or safety net providers' preferences for targeting particular subpopulations, will also vary with the distance to the nearest safety net provider. Thus, it is reasonable to presume that the level of access and proximity to a safety net provider are jointly determined, with each affecting the other and both potentially influenced by some of the same unobserved factors.[5]

To address this statistical problem, IV estimation uses "instruments," that is, factors hypothesized to influence the location of safety net providers but not the population's level of access or unobservable factors that may influence access, to replace observed distances by predicted distances estimated from a first-stage model.[6] The key assumptions of IV estimation are that (1) the instruments are significantly correlated with the distance measures and (2) are uncorrelated with the error terms in the access models (Staiger 2002; Staiger and Stock 1997; Bound, Jaeger, and Baker 1995).

The independent variables in the first-stage prediction models include all of the exogenous independent variables from the access models (specified

above) plus three lagged, area-level variables hypothesized to satisfy the key IV assumptions: the average percentage of voters in the county who voted for the Democratic candidate in the 1992 and 1996 national presidential elections, the payment generosity of the state's welfare program (AFDC—Aid to Families with Dependent Children) in 1995, and the number of medical school faculty in the county in 1996.

We hypothesize that all three are associated with greater safety net availability, which translates into shorter distances to the nearest safety net providers. The percentage of voters supporting the Democratic candidate and the payment generosity of the state's welfare program reflect political liberalism and a greater willingness to support care to low-income people through the safety net. The number of medical school faculty in a county reflects both the availability of physicians to staff safety net facilities, as well as academic medical institutions' roles in generating funds for safety net providers through grants and legislative lobbying.

Although the access measures analyzed are dichotomous, we use linear regression to estimate the models because the statistical tests of the IV assumptions do not necessarily hold for nonlinear (logistic) models. (Logistic regression models, which are available on request, produced qualitatively similar results.) The first assumption is tested by an *F*-test of the null hypothesis that the instruments' coefficients are jointly insignificant. As shown in the online-only Appendix Table 1 (available at www.blackwell-synergy.com), which reports the first-stage distance models, all three of the exogenous identifying variables are statistically significant and negative in the first-stage models for predicting distance, suggesting that people living in areas with higher proportions of Democratic voters, greater medical school capacity, and more generous AFDC programs have greater safety net availability, that is, shorter distances to the nearest CHC and SNH.

The *F*- statistics for testing the joint significance of the exogenous identifying variables in the first-stage distance equations are 16.1 in the model for distance to the nearest CHC and 32.7 in the model for distance to the nearest SNH. These *F*-statistics are well above the rule-of-thumb benchmark of an *F*- statistic value of 10. The partial R^2s are 0.047 and 0.032, which account for 12.2 percent and 17.4 percent of the explained variation in the CHC and SNH distance models, respectively.

The test statistic for the assumption that the instruments are uncorrelated with the error terms in the access models is $N*R^2$, which has a chi-square distribution (Greene 1990, pp. 638–9). (N is the number of observations and the R^2 is from regressions of the residuals from the access models against all of

the independent variables in the first and second-stage models.) The hypothesis of no relationship between the exogenous variables and the residuals is accepted if the test statistic, $N*R^2$, is smaller than the appropriate critical value.

The test statistics satisfy this criterion for five of the access measures at the 0.05 level and for one additional measure at the 0.01 level. The R^2s for the two measures with larger test statistics are 0.0023 and 0.0027, suggesting that the level of correlation is very low, even though it does not strictly meet the second assumption. These test statistics indicate that the instrumental variables we use clearly satisfy the first IV assumption and generally satisfy the second.

FINDINGS

Distance to Safety Net Providers

More than one-third of uninsured persons (37 percent) live within a very short distance to a safety net provider (Table 2). Another 23.5 percent live between 1 and 5 miles from a zip code area with a safety net provider. Almost

Table 2: Percent Distribution of Uninsured, by Distance to Nearest Safety Net Provider

	Uninsured in All Areas *Percent*	*Uninsured in Largest Metro Areas* *Percent*
Distance between zip code centroids of uninsured and nearest safety net provider:		
Less than 1 mile	37.0	52.2
Between 1 and 5 miles	23.5	28.8
Between 5 and 10 miles	16.1	12.3
10 miles or greater	23.4	6.7
Distance to specific providers		
FQHCs		
% within 1 mile	27.7	45.2
% within 5 miles	46.0	72.7
Other free clinics		
% within 1 mile	10.6	18.2
% within 5 miles	23.8	40.1
Public hospitals		
% within 1 mile	13.1	15.7
% within 5 miles	29.0	40.3
Private safety net hospitals		
% within 1 mile	18.9	25.8
% within 5 miles	39.6	55.4

one-fourth of uninsured persons (23.4 percent) live 10 miles or more from a safety net provider.

Not surprisingly, uninsured persons in the largest metropolitan areas tend to have greater access to safety net providers. About half (52.2 percent) live in the same zip code area, while about 80 percent live within 5 miles of a safety net provider. Only 6.7 percent have to travel 10 miles or more to get to a safety net provider, and most of this is due to the fact that there are no safety net providers in the area.

Among the four types of safety net providers considered in this study, FQHCs are the most frequently available to uninsured persons. Nearly half (46 percent) of the uninsured live within 5 miles of a FQHC, while less than 30 percent of the uninsured live within 5 miles of any other type of safety net provider (Table 2). This is consistent with the fact that FQHCs are far more numerous than any other facility type.

Multivariate Analysis

Table 3 presents the mean values of the independent variables and the OLS and IV estimates of the model for having any usual source of care. Looking first at the OLS estimates, neither variable measuring distance to a safety net provider approaches statistical significance. In contrast, both of the IV estimates have negative signs, suggesting that increasing distance from a safety net provider reduces the probability of reporting a usual source of care. Moreover, the magnitudes of the coefficients are much larger than the OLS estimates, and the coefficient for distance to a safety net hospital is statistically significant ($p = 0.03$). Although the coefficient of distance to the nearest CHC is insignificant, this result may be due to the relatively high correlation between the two predicted distance variables ($\rho = 0.84$). When the model is estimated with either one or the other distance variable omitted, each is statistically significant, and the coefficient of distance to the nearest CHC increases almost threefold, to -0.0056 ($p = .01$).

Table 4 presents a summary of the OLS and IV coefficient estimates of the distance variables from the other access models. (Complete results are available on request.) The first two measures examine whether the person reports either a health center or a hospital outpatient department as a usual source of care, given that they have a usual source. We include these measures to validate our assumption that proximity to particular type of safety net provider is a reasonable indicator of access to that type of provider. The OLS estimates are statistically significant and have good face validity. People who

Table 3: IV and OLS Estimates of Usual Source of Care

		Coefficients (p-values) by Estimation Method			
		OLS Regression		*IV Regression*	
Independent Variable	*Mean Value*	*Beta*	*p-value*	*Beta*	*p-value*
Distance to nearest safety net provider (miles)[a]					
Community Health Center (CHC)	12.63	0.0001	0.85	−0.002	0.52
Safety Net Hospital (SNH)	14.51	−0.0004	0.44	−0.01	0.03
Age (years)	31.7	−0.02	0.00	−0.01	0.00
Age-squared	1,225.8	0.0002	0.00	0.0002	0.00
Annual family income ($10,000s)	21.9	0.000001	0.03	0.00	0.02
Education (years)	11.9	0.003	0.42	0.003	0.38
Female[b]	0.511	0.14	0.00	0.14	0.00
Race and ethnicity[b]					
African American	0.163	−0.02	0.30	−0.09	0.002
Hispanic	0.240	−0.07	0.02	−0.11	0.001
Other race	0.050	−0.05	0.27	−0.09	0.03
Interviewed in Spanish	0.160	−0.11	0.0017	−0.13	0.0004
Health status[b]					
Excellent or very good	0.573	−0.02	0.34	−0.01	0.82
Good	0.260	−0.06	0.02	−0.06	0.04
Family structure[b]					
Single person w/o children	0.372	−0.05	0.04	−0.08	0.00
Single person w/children	0.180	0.03	0.28	0.00	0.86
Married couple, no children	0.112	−0.03	0.33	−0.03	0.34
Community Type[b]					
Small metro	0.032	−0.07	0.08	−0.03	0.38
Nonmetro	0.111	0.11	0.0001	0.24	0.00
Risk Preference[b]					
Strong risk taker	0.194	−0.03	0.15	−0.02	0.35
Moderate risk taker	0.273	0.00	0.84	0.00	0.77
Risk preference missing	0.060	0.00	1.00	−0.01	0.69
Intercept		0.74	0.00	0.88	0.00
R-squared		0.097		0.102	

[a]Straight-line distances calculated from latitude and longitudes of population centroids of 5-digit zip codes.

[b]Dichotomous variable of uninsured persons and safety net providers.

are closer to a CHC are more likely to report a health center as their usual source of care and less likely to report a hospital outpatient department as the usual source of care. Distance to the nearest SNH has the opposite effect—a shorter distance increases the proportion citing an outpatient department as their usual source of care and reduces the proportion with a health center as their usual source.

Table 4: Coefficients (*p*-values), Distances to Safety Net Providers, by Access Measure and Estimation Method* (mean % reporting in parentheses)

	Coefficient (p-value)	
Access and Distance Measures (mean % reporting in parentheses)	*OLS*	*IV*
Usual Source of Care		
Usual source—health center[a] (25.4)		
CHC distance[b]	−.0018 (.01)	−.0045 (.16)
SNH distance[c]	.0020 (.01)	.0049 (.42)
Usual source—outpatient dept.[a] (15.0)		
CHC distance	.001 (.02)	.005 (.05)
SNH distance	−.001 (.10)	−.018 (.00)
Access Problems[d]		
Unmet medical need (15.3)		
CHC distance	.00011 (.78)	.0035 (.02)
SNH distance	.00043 (.24)	−.0031 (.14)
Delay/postpone needed care (29.4)		
CHC distance	.00036 (.34)	.0031 (.09)
SNH distance	−.00006 (.89)	−.0033 (.21)
Service Use[d]		
Any ambulatory visit (59.3)		
CHC distance	.00035 (.46)	.0011 (.67)
SNH distance	−.0004 (.45)	−.0113 (.00)
Emergency room visit (19.1)		
CHC distance	.00084 (.11)	.0050 (.02)
SNH distance	.00011 (.84)	−.0037 (.19)
General medical visit (32.8)		
CHC distance	.00036 (.49)	−.0080 (.00)
SNH distance	−.00037 (.51)	.0001 (.99)
Hospital stay (4.6)		
CHC distance	.00028 (.47)	.0026 (.01)
SNH distance	−.00011 (.62)	−.0023 (.10)

[a]Conditional on having a usual source of care

[b]Distance in miles to nearest community health center of any type.

[c]Distance in miles to nearest safety net hospital.

[d]Reference period is the last year.

*Complete equations are available on request.

Instrumental variable estimation increases the magnitudes of the coefficients, especially for the SNH distance variable in the model for having an outpatient department as a usual source of care. However, in the model for having a health center as the usual source, the standard errors also increase, so that we cannot reject the hypothesis that the IV estimates are different from either the OLS estimates or from 0. Nonetheless, both the OLS and IV models

suggest that the distance measures have good face validity as indicators of access to safety net providers.

The second and third panels of Table 4 report the coefficients from the measures of access problems and actual service use. In these models, the effect of endogeneity bias is much more readily apparent. None of the OLS coefficients approaches statistical significance and all are very small in magnitude. The IV estimates, on the other hand, are much larger in magnitude and at least one is statistically significant in each of the models. Closer proximity to a CHC significantly reduces the probability that an uninsured person reports having had an unmet medical need or having postponed or delayed obtaining needed medical care.

Proximity to an SNH is significantly related to having any ambulatory visit in the last year. Distance to a CHC is not significantly associated with having had any type of ambulatory visit, but this appears to result from its having opposite effects on general medical and emergency room visits. Uninsured people living closer to a CHC are significantly more likely to have had a general medical visit, but significantly less likely to have had an emergency room visit. Proximity to the different types of safety net providers is also significantly related to whether an uninsured person was hospitalized. Living closer to an SNH increases the chances of a hospital stay, while proximity to a CHC reduces the likelihood of a hospital stay.

Policy Simulations

To evaluate the potential consequences of expanding the safety net, we used the IV regression parameters to simulate the effects of reducing the distances to the nearest CHC and SNH to the median distances we observe in our data, 5 miles to the nearest CHC and 11.4 miles to the nearest safety net hospital. (The simulations hold constant the effects of all other factors and change only the values of the distance variables.) In effect, this simulation assumes that a substantial expansion of the safety net, by establishing new CHCs, opening new public hospitals, and subsidizing more private hospitals to take on safety net roles, would have the effect of reducing the distances uninsured people would have to travel to reach a safety net provider.

Table 5 shows the results of these simulations for three of the access measures: having a usual source of care, reporting an unmet need, and having any ambulatory visit.[7] The baseline for the simulations is the actual percentages of the uninsured reporting each of the measures. The simulations suggest that reducing the distances to the nearest CHC and SNH would increase the

Table 5: Policy Simulations

	Uninsured			
Access Measure	*Baseline*[a]	*Simulated*[b]	*Privately Insured*	*Medicaid*
Percent with any usual source of care	58.8	66.3	88.3	85.2
Percent with unmet need	15.2	11.7	5.1	8.4
Percent with any ambulatory visit	59.1	66.5	83.6	87.7

[a]Based on actual distances to nearest community health center and safety net hospital.

[b]Sets maximum distances to nearest community health center and safety net hospital at observed median distances of 5.0 miles and 11.4 miles, respectively.

percentage of uninsured people reporting any usual source of care and having any ambulatory visit, and reduce the proportion reporting an unmet need.

To provide a context for the simulations, Table 5 also shows the means of the access measures for the privately insured and Medicaid covered people. Two conclusions are clear from the simulations. First, expanding safety net availability appears to provide substantial gains in access for the uninsured population. The percentages with a usual source of care and any ambulatory visit would increase by more than 10 percent, and the percentage with an unmet need would decrease by almost 30 percent. Second, even with these significant improvements in access, the gap between the uninsured and the insured would remain large.

DISCUSSION

The Bush administration has made expansion of the safety net one of its top health care priorities, proposing to fund 1,200 new or expanded sites by the year 2006, an increase of over one-third from the 3,300 existing sites in 2001 (Office of Management and Budget 2002). Overall, however, the increase in expenditures from the 2002 CHC budget of $1.3 billion would represent a fairly small expansion of total safety net capacity, which has been estimated to be about $25 billion overall (Hadley and Holahan 2003).

Nevertheless, the CHC expansions could significantly increase the number of uninsured persons with access to safety net providers. Based on the data in this study, 60 percent of uninsured persons (about 21 million people) currently live within 5 miles of a safety net provider. If the increase in the number of new centers results in a proportionate increase in the number of uninsured who live within 5 miles of these centers (i.e., a 36 percent increase),

then up to 7.5 million additional uninsured persons could gain access to CHCs. This increase would represent more than half of the uninsured who currently do not have access to safety net providers (14 million, based on CTS estimates for 2000–2001).

The results of this study strongly suggest that increased availability of CHCs to more uninsured persons will improve their access to medical care, specifically in terms of more uninsured having a usual source of care, fewer having unmet medical needs, and more having any ambulatory or general medical visits. The results also suggest that greater availability of CHCs may reduce the uninsured's use of costly hospital services by reducing the probabilities of emergency department use and of inpatient hospital stays. It may be that CHC availability encourages the uninsured to seek care for symptoms on a timelier basis when they can be treated in an outpatient setting without requiring more expensive hospital resources. If so, then expanding CHC capacity might improve delivery system efficiency, which would offset some of the costs of expanding CHC capacity.

The results further suggest that failure to correct for endogeneity bias, that is, the fact that safety net providers tend to be located near populations with poor access because of low income and lack of insurance, will lead to erroneous conclusions that the safety net has no impact on access to care for the uninsured. Using an instrumental variable approach to adjust the measures of the distances to the nearest community health center and safety net hospital, the multivariate regression estimates imply that expanding safety net availability would significantly improve access to care for the uninsured.

However, these improvements in access are relatively modest when comparing the uninsured to those with Medicaid or private insurance coverage. The results indicate that even when the uninsured live near safety net providers, there are still considerable disparities in their access to care compared with insured persons. This may reflect limitations among safety net providers, who often have capacity constraints, medical staff shortages, and limitations on the types of services they provide. Some safety net providers—particularly private providers—may limit the number of uninsured patients they see or the types of services they provide to uninsured persons. Primary and preventive care services are frequently emphasized at CHCs, while specialty care services often have to be referred outside of the facility. Many clinics operate on a walk-in basis rather than through appointments, and long queues could discourage some from using some safety net providers. It is likely that a much larger expansion of safety net availability than what is currently being proposed would be needed to address these limitations.

Limitations

The measure of distance to safety net providers is limited in that it is not a measure of overall safety net capacity and does not directly distinguish between uninsured people living close to a relatively limited safety net versus those living close to an extensive safety net with multiple providers, nor does it directly measure differences in travel times. In addition, distances are approximate because they are based on zip code population centroids rather than actual addresses of safety net providers and survey respondents.

Another related limitation is that the identification of safety net providers may be somewhat imprecise, especially that of private safety net hospitals. Although we have identified the major safety net providers, they are not all equal in their willingness and ability to provide services to uninsured persons, and providers in some communities that provide an important safety net function (e.g., local health departments) may be excluded.

There may be an element of selection bias in limiting the sample to uninsured people, since proximity to a safety net provider may influence whether a person is uninsured, although other research suggests that this effect is probably small (Herring 2001). Similarly, the disparity in access to care between uninsured and insured persons may actually be smaller or larger depending on whether access and use of services influence the likelihood of having insurance coverage.

Some of the IV estimates were relatively imprecise, in part because of the correlation between the two distance measures. Nevertheless, by measuring distances to safety net providers for a large nationally representative sample of uninsured persons, and addressing two of the major sources of bias in previous research on the effects of the safety net (selection and endogeneity), this study provides more reliable evidence of the effects of the safety net on access to care of uninsured persons than has been available previously.

Finally, the use of IV estimation remains controversial because one can never be sure that one has the perfect or best instruments (Fisher et al. 2003). While the instruments we used satisfy the tests of the key IV assumptions, we cannot conclude that these are the best possible instruments or that other "better" instruments would produce similar results. Preliminary analyses using alternative instruments (the physician-to-population ratio in the county, population density, and a state's level of tax effort) and alternative combinations of instruments indicated that the values of some of the IV parameter estimates (effect of CHC distance on type of usual source of care) might be from half to twice as large as reported in Table 4. However, other statistically

significant IV estimates in Table 4 were quite robust with respect to alternative specifications of the instruments.

In spite of the underlying uncertainty about the precise values of the measures of distances to the nearest community health center and safety net hospital, we believe that this analysis clearly shows that the OLS estimates are biased toward 0, and that using IV estimation suggests that closer proximity to safety net providers increases access to care for the uninsured. While the choice of instruments cannot be justified solely on a priori grounds, testing the sensitivity of these findings to instruments that have high a priori face validity and satisfy the appropriate statistical tests should be a priority for future research on the effects of the safety net on access to care.

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NOTES

1. We also exclude office-based physicians because our focus is on safety net institutions, which are the targets of public policy. Moreover, CTS physician survey data show that while most physicians provide some charity care, very few physicians provide a lot of charity care (i.e., more than 5 percent of their practice time). Thus, it is questionable as to whether most physicians who provide charity care should be considered "safety net" providers similar to CHCs and public hospitals.
2. There is a potential selection issue in limiting the sample to people who are uninsured, since the availability of care from the safety net may influence the demand for insurance. This issue will be addressed in future work that includes insured and uninsured low-income people and treats insurance status as endogenous.
3. Because zip code information in the household survey was self-reported by respondents during the telephone interview, zip codes were missing, incomplete, or invalid for about 12 percent of sample persons. For most of these, zip code was imputed based on the telephone area code and exchange using a plurality rule (i.e., the zip code that contains the highest proportion of published telephone numbers with that exchange). Imputations could not be performed for about 200 cases, which are excluded from the analysis. Results are almost identical when the cases with

imputed zip codes are excluded from the analysis, indicating that the imputation does not seriously bias the results.

4. In preliminary analyses, we also included a measure of the number of physicians relative to population in the person's zip code of residence. This variable was never statistically significant, but was correlated with the distance measures and tended to reduce their statistical significance, but not the values of the parameter estimates. It was dropped from the final models for these reasons.
5. Although reverse causality and the existence of unobservables affecting both access and safety net provider location are conceptually distinct phenomena, they have identical implications for empirical estimation.
6. Another rationale for IV estimation is that it also addresses the problem of measurement error (Kmenta 1971, p. 309), since the straight line distance between two population centroids does not account for variations in specific addresses or for variations in travel times due to differences in congestion and topographical features.
7. For the access problem measure, percent reporting an unmet need, we assume that proximity to a safety net hospital has no effect, that is, we set its coefficient to 0 in the simulation, since its estimated coefficient was statistically insignificant and had the "wrong" sign in this model. Thus, this simulation should be thought of as a best-case scenario in terms of the effects of safety net expansion on having an unmet need.

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Appendix Table

First-Stage Distance Models
(Coefficients and p-values)

	Distance to Nearest Community Health Center		Distance to Nearest Safety-Net Hospital	
Independent Variable	**Coeff.**	**p-value**	**Coeff.**	**p-value**
Intercept	31.71	0.00	20.17	0.00
Female	-0.15	0.74	-0.60	0.12
African-American	-3.96	0.008	-4.75	0.00
Hispanic	-4.41	0.00	-1.86	0.07
Other	-1.84	0.22	-0.96	0.57
Excellent/ very good health	0.76	0.30	1.54	0.003
Good health	0.20	0.75	0.58	0.28
Strong risk taker	0.36	0.49	0.03	0.96
Moderate risk taker	-0.32	0.54	-0.17	0.79
Missing	-0.91	0.36	-0.11	0.90
One Person	-1.74	0.02	-2.04	0.01
Married couples	-0.14	0.90	0.94	0.40
Single parent w/kids	-2.48	0.001	-1.24	0.26
Small Metro	-1.55	0.51	-5.75	0.00
Nonmetro	20.25	0.00	8.41	0.01
Interview Conducted in Spanish	-1.03	0.34	-1.84	0.07
Age	-0.03	0.59	0.10	0.01
Age square	0.0005	0.45	-0.001	0.02
Annual family income	-0.00003	0.12	-0.000005	0.76
Education	-0.05	0.72	0.06	0.64
Exogenous Identifying Variables				
Pct. voting Democratic, 1992 & 1996[a]	-24.69	0.03	-13.67	0.02
AFDC payment generosity[b]	-0.02	0.03	--	--
Medical school faculty[a]	--	--	-0.003	0.00
R-Square	0.38	--	0.18	--
Joint F-Statistic	16.08	<0.01	32.65	<0.01

[a] County variable.
[b] State variable.