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Effects of Community Factors on Access to Ambulatory Care for Lower-Income Adults in Large Urban Communities

This study examines the effects of community-level and individual-level factors on access to ambulatory care for lower-income adults in 54 urban metropolitan statistical areas in the United States. Drawing on a conceptual behavioral and structural framework of access, the authors developed multivariate models for insured and uninsured lower-income adults to assess the adjusted effects of community- and individual-level factors on two indicators of access: having a usual source of care, and having at least one physician visit in the past year. Several community factors influenced access, but they did so differently for insured and uninsured adults and for the two measures of access used. The findings of this study confirm that public policies and community environment have measurable and substantial impacts on access to care, and that expanded public resources, such as Medicaid payments and safety-net clinics, can lead to measurable improvements in access for vulnerable populations residing in large urban areas.

Interest in the effects of community-level (or contextual) factors on access to care grew considerably during the 1990s. This interest grew out of concerns that policy and delivery system changes that affected the safety net could adversely affect access to care for the most vulnerable subgroups. This study builds on the findings reported from other population-based multivariate studies investigating geographic variation in access (Davidson et al. 2004).[1] These studies investigated the influence of community-level variables on having at least one physician visit in the past year (Andersen et al. 2002; Cunningham 1999; Grumbach, Vranizan, and Bindman 1997; Long and Marquis 1999), having a regular source of care (Cunningham 1999; Lave et al. 1998), and other measures of access. Previous studies have found that differences in access across geographic areas are affected by population characteristics, the supply of physicians, the availability of safety-net resources, Medicaid managed care penetration and rates of uninsurance (Cunningham 1999; Grumbach, Vranizan, and Bindman 1997; Long and Marquis 1999). Most studies have investigated the characteristics of the safety-net population, with fewer studies examining

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Inquiry 41: 39–56 (Spring 2004).
0046-9580/04/4101–0039

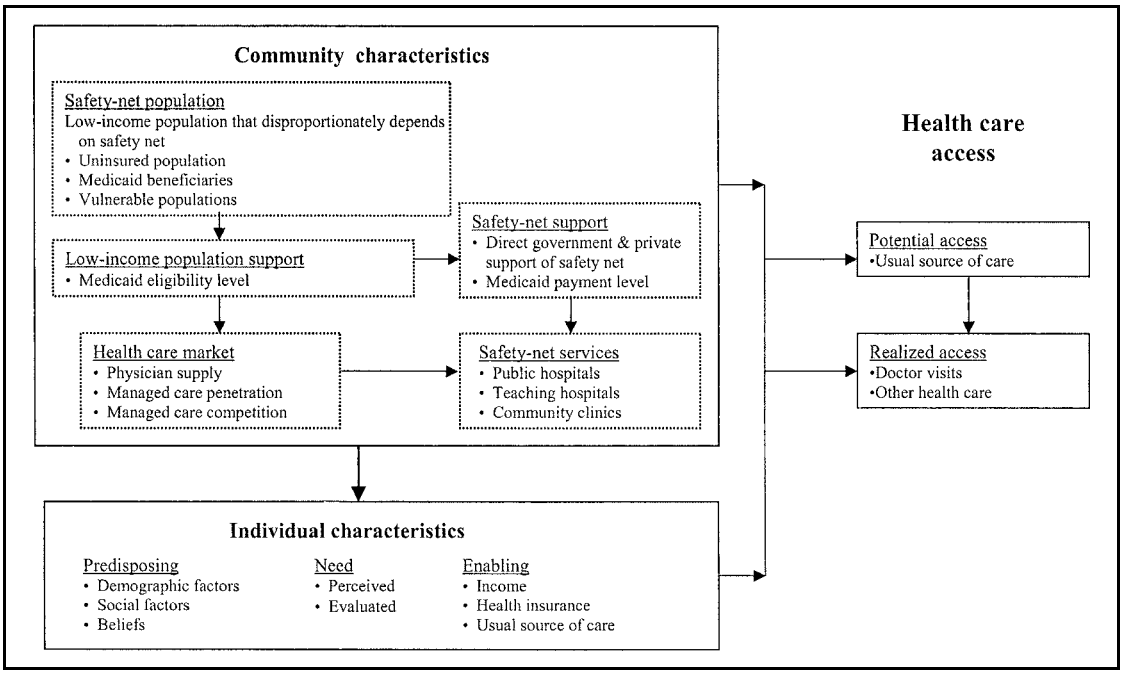

Figure 1. Effects of community characteristics on access to ambulatory care for lower-income adults

community variables that reflect the supply of health care services or public policy support for that group or the low-income population. The present study advances the research by systematically analyzing the effects of community-level variables on access to ambulatory care across a large number of metropolitan areas.

Conceptual Framework

This study adapts a conceptual and analytical framework (Figure 1) to test the effects of community- and individual-level variables on access (Davidson et al. 2004). *Individual-level characteristics* are attributes of the individual that influence whether a person will seek care. We categorize them as predisposing, enabling, and need variables, based on Andersen's widely cited behavioral model (1968, 1995). One of the key enabling factors we consider is whether an individual has health insurance coverage, which provides a base of financial access to health care services.

Community-level characteristics describe the neighborhood, city, or metropolitan area context in which individuals live and may, or may not, seek care. We have categorized community-level factors as: 1) the safety-net population in need, 2) support for the low-income population, 3) safety-net services, 4) support for the safety net, and 5) the broader health care market (Davidson et al. 2004; Norton and Lipson 1998; Meyer et al. 1999; IOM 2000).

Access indicators measure potential and realized entry into the primary care system. Potential access is an indicator of whether an individual has a relationship to the health system that is likely to facilitate obtaining services, while realized access indicates whether the individual obtained care.

In our model, one of the most important community determinants of access is the magnitude of the geographic area's population that tends to rely on the health care safety net, such as community clinics, public hospitals and clinics, and teaching hospitals. This population is characterized by the number and proportion of people who are likely to experience access barriers, including the proportions of residents who are uninsured and have low incomes, who are Medicaid beneficiaries, who are low-income in general, who have special medical needs or who are ethnically or culturally distinct (such as immigrants and ethnic minority groups) (IOM

2000, 2003; Brown, Wyn, and Teleki 2000). The size of this safety-net population is important because the larger it is as a proportion of the area's entire population, the more strain it is likely to impose on sources of care used by these disproportionately low-income groups.

A second category of community-level variables indicates support for the low-income population. This category includes such public policy supports as the generosity of Medicaid eligibility, which provides at least some financial access to care for low-income populations. Such support for these populations' access to care is a major determinant of the extent to which they can access the larger health care market and the extent to which they bring reimbursement when they use safety-net services (Lurie et al. 1986).

A third category is comprised of safety-net services, which we measure by the number of community-based clinics and the shares of ambulatory care that are accounted for by public hospitals and teaching hospitals. Due to the lack of consistent data on community clinics across states and locales, we use the number of federally qualified community health centers (FQHCs) per 10,000 low-income residents as the measure in our model. In most cities, the health care safety net provides a substantial share of care for low-income populations with a variety of health and social needs.

A fourth community-level factor is support for the safety net, represented by two variables. One indicator of support for the safety net is the total grants from the federal Health Resources and Services Administration (HRSA) to FQHCs per low-income resident. The second safety-net support indicator is the amount of Medicaid payments to health care providers (excluding nursing home payments) per enrollee. Despite some limitations (discussed subsequently), these indicators provide measures of major support that flows to health care providers that serve the low-income population; the amount of such support is likely to greatly influence the capacity of the safety net to meet demands generated by the low-income population.

The final category of community-level variables is the health care market—the supply of services that provide for the health care needs of the broader population. We expect lower-income people to have better access in metropolitan areas with a greater supply of physicians, that is, a higher ratio of physicians to population. We also expect less access for lower-income people where health maintenance organizations (HMOs) dominate the health care market (which we measure as HMO penetration, or total HMO enrollment divided by the total population in a geographic area), and where HMOs compete intensely for commercial contracts, potentially driving down the margin that hospitals and other providers may use to provide uncompensated care (which we measure as HMO competition, an index that ranges from equal competition in a geographic area to a monopoly).

In this study, we investigate the effects of community-level factors on potential and realized access. "Potential" access variables, such as having a regular source of care, influence whether an individual is likely to obtain medical care when needed. "Realized" access variables measure actual utilization of medical care, such as having at least one physician visit in the past year.

Research Questions

Previous studies have found a consistent relationship between individual-level predisposing, enabling, and need characteristics and access indicators such as having a usual source of care (potential access) and reporting at least one physician visit in the past year (realized access). Although researchers have reported geographic variation in access, only a few studies have examined the multivariate effects of safety-net and other community-level characteristics on access (Andersen et al. 2002; Cunningham 1999; Grumbach, Vranizan, and Bindman 1997; Long and Marquis 1999). We expect that the characteristics of the safety net and other community factors influence access, over and above the effects of individual-level variables. This study sheds light on several research questions concerning community-level determinants of access:

1. Does the relative size of a community's population that depends on the safety net affect the potential and realized access of lower-income adults, and if it does, how does dependence on the safety net vary by health insurance status?
2. Does a larger supply of safety-net health services generate better potential and realized access for lower-income adults, and if it does,

how does the effect of supply vary by health insurance status?
3. Does greater support for the safety net translate into better potential and realized access of lower-income adults, and if it does, how is the effect of such support different for those with health insurance compared to those without insurance?
4. Does greater HMO penetration and competition in a community's health care market affect the potential and realized access of lower-income adults, and does such an effect differ for insured people compared to uninsured people?

Methods

Population Data Source

The data source for this study is the 1995 and 1996 National Health Interview Survey (NHIS). Sponsored by the National Center for Health Statistics, the NHIS is an in-person survey with a probability sample of the noninstitutionalized population of the United States. The analysis was restricted to lower-income adults, ages 19–64, in 54 metropolitan statistical areas (MSAs) with a population range of at least 330,000 to more than nine million. Lower-income adults were those who reported a household income less than or equal to 250% of the federal poverty level (FPL). We merged and reweighted the 1995 and 1996 NHIS to provide larger samples for each of the study MSAs ($n = 12{,}861$). Three Connecticut MSAs with populations exceeding 330,000 (Danbury, New Haven, and Stamford) and Miami, Florida, were excluded from the NHIS database due to either a small sample of lower-income adults or because community-level variables were not available for these geographic areas. Data sources for the community variables are listed in the section that follows.

Variable Definitions and Data Sources

The dependent variables and all individual-level variables are from the NHIS. The measure of potential access is based on the widely used question: "Is there one doctor, person, or place that you usually go to when you are sick or need advice about your health?" ("0" = no; "1" = yes). The measure of realized access is derived from the following question: "During the past 12 months, about how many times did you see or talk to a medical doctor or assistant?" The variable was dichotomized for logistic regression analysis ("0" = no visits in the past 12 months; "1" = had at least one physician visit in the past 12 months). This represents a very conservative measure of realized access, and one that is minimally sensitive to variation so that any observed variation is more likely to have important consequences for individuals.

The access dependent variables are considered to be strongly influenced by predisposing, enabling and need factors. These variables, measured at the individual level, include:

- ☐ ***predisposing factors***: age, gender, race and ethnicity, educational attainment, marital status, and recent immigration;
- ☐ ***enabling factors***: household income, health insurance coverage, and presence of a usual source of care (also used as the potential access dependent variable); and
- ☐ ***perceived need***: a constructed variable based on self-rated health status equal to poor or fair and/or any activity limitation; and self-rated number of bed days in the past 12 months.

Other factors were measured at the community level and to the extent feasible were constructed for years matching the NHIS individual-level variables. For community variables that reflect aggregated population differences, we relied primarily on data from the March 1996 and 1997 Current Population Surveys (CPS), using questions that asked about characteristics during the previous calendar year. We calculated simple averages for each MSA, averaging the 1996 and 1997 indicators to produce more stable estimates.

Safety-net population. The safety-net population was measured at the MSA level by the following variables: 1) percentage of the total MSA population with household income up to 250% FPL (computed from CPS, 1996–97), the population from which most safety-net users are expected to come; 2) percentage of the lower-income ($\leq$250% FPL) nonelderly population that was uninsured (computed from CPS, 1996–97), the portion of the lower-income population that is highly likely to depend on safety-net services; 3) percentage of the nonelderly population with family income below 250% FPL who reported Medicaid coverage (computed from CPS,

1996–97), because Medicaid beneficiaries often experience difficulty obtaining services from mainstream providers and thus depend on safety-net services; 4) percentage of the total MSA population who were immigrant noncitizens (computed from CPS, 1996–97), because of their need for non-English language services offered by many safety-net providers; and 5) percentage of total population in each major racial/ethnic group (i.e., percentage Latino, non-Latino white, non-Latino African American, non-Latino Asian and Pacific Islander, and other) (data from Claritas/NPDC 1997), because people of color are disproportionate users of safety-net providers.

Low-income population support. The amount of support provided directly to the low-income population for its health care is measured by an index of Medicaid generosity (information from the National Governors Association 1997).[2]

Safety-net services. The low-income population is expected to have better access in communities with a larger health care safety net, which we measured by: 1) number of FQHCs (computed from data files supplied by HRSA for 1997) divided by the number of MSA respondents with income below 250% FPL (CPS 1996–97); 2) percentage of total MSA outpatient department visits accounted for by public hospitals (AHA 1997), which disproportionately serve uninsured and Medicaid patients; and 3) percentage of total MSA outpatient department visits in major teaching hospitals in the MSA (AHA 1997), which also disproportionately serve uninsured and Medicaid patients.[3] The number of FQHCs captures the largest community-based clinics, but it does not include non-FQHC clinics or the number of satellite clinics operated by a single FQHC.

Support for safety net. The level of support provided to the health care safety net in an MSA was measured by: 1) amount of grant funds provided by the federal HRSA Bureau of Primary Health Care to FQHCs in the MSA per resident with family income at or below 250% of the federal poverty level (computed from data files supplied by HRSA for 1997);[4] and 2) total Medicaid payments per eligible beneficiary (excluding nursing home payments) in the metropolitan statistical area (computed from 1997 Health Care Financing Administration [HCFA] 2082 data). Both of these measures have limitations. The grant funds account only for those provided by HRSA and do not include those provided by state or local governments or by philanthropic foundations. The HCFA 2082 reports do not include DSH payments to hospitals that serve a high-volume of Medicaid inpatients or Medicaid managed care payments (which included one-third of Medicaid beneficiaries in 1995). Although such payments may have an indirect effect on ambulatory care (the focus of this study) by providing more resources in general for the safety net, the payment types included in this study capture some of the largest and most important sources of support.

Health care market. We measured the supply of physicians as the number of non-federally employed medical doctors who provide patient care per 1,000 population (based on the American Medical Association Physician Masterfiles of the Physician's Professional Activity Questionnaire for 1996–1997; Area Resource File 1999). We measured HMO market domination by the HMO penetration rate, in which the HMO total enrollment is divided by the total MSA population (Interstudy 1998). We measured HMO competition using an index calculated by subtracting from 1 the sum of the squared percentage of total HMO market share for each of the HMOs operating in a particular MSA (Interstudy 1997, 1998). (A value close to 1 indicates several nearly equal competitors; a value close to 0 indicates a monopoly.)

Statistical Methods

We conducted a careful examination of the interactions among all community- and individual-level variables. Additional diagnostic procedures were performed to identify possible collinearity among the community-level variables within each domain (safety-net population, support for the low-income population, safety-net services in the area, support for the health care safety net, and the health care market) that were most significantly related to the access dependent variables. This step was necessary because some of the community-level variables within conceptual domains were highly correlated, particularly among the MSA-level population characteristics (e.g., percentage of the population that has low income, percentage of the total population that is Latino, and percentage of the population that is both low income and uninsured). Community-level variables with correlations that exceeded .80 were considered highly correlated and were examined closely to decide whether to include/

exclude them. In the final analysis, hierarchical logistic regression was used to determine whether community-level variables have statistically significant effects on having a usual source of medical care (potential access) or in the probability of having at least one physician visit in the past 12 months (realized access). We fitted separate models for the low-income uninsured population and the low-income insured population because we expected that community-level factors would affect them differently due to the strong effect of health insurance on access measures (IOM 2003).

All individual-level variables from the 1995–96 NHIS database were entered in the logistic regression analysis to adjust for differences in predisposing, enabling, and need characteristics of lower-income adults in the 54 study MSAs. While forcing individual-level variables in the model, we then separately entered community variables from each domain using a stepwise procedure to identify those that were statistically significant to be the final set of candidate community-level variables for the models. The final set of community variables was entered into the regression models for each dependent variable, controlling for the effects of the individual-level predictors. In the model selection stage for both models, we used SAS software (version 8.2) and eliminated several community-level variables that were not statistically significant. We then used SUDAAN software (version 8.0) to recalculate the variances and significant tests for the parameter estimates in the regressions, taking into account the effects of sample design. At this stage, we kept in the models some of the community-level variables that became marginally nonsignificant.

Results

Overall, the aggregate population of lower-income ($\leq$250% FPL) nonelderly adult residents of the 54 study MSAs is disproportionately young, with 63.4% under age 40 compared to 54.4% of all adult residents at all income levels in the study MSAs (Table 1). This population is also disproportionately Latino (19.8% of lower-income adults vs. 10.9% of all adults) and African American (20.6% vs. 13.7%). Nearly one in five (18.6%) did not complete high school, more than twice the proportion of all adult residents. Lower-income nonelderly adult residents are nearly twice as likely to be recent immigrants (6.1% vs. 3.2% of all adults). One in four has less than favorable self-rated health status, one-and-a-half times the proportion of all adults (16.9%). One in three lower-income adults is uninsured (compared to 17.8% of all adults), and another 13.3% are covered by Medicaid (compared to 5.3% of all adults). One in four has no usual source of care (compared to 16.7% of all adults), an important factor that enables people to more readily obtain health services when they perceive the need for them. Despite poorer health status, approximately the same proportion of lower-income adults and all nonelderly adults in the study MSAs visited a physician in the past year (69.2% and 73.5%, respectively). Relative to insured adults in this population, the uninsured population is disproportionately younger, male, Latino and Asian, less educated, single, immigrant, low-income, and in better health (Table 1).

Variation in MSA-Level Indicators

The 54 MSAs in our study vary greatly in the proportions of lower-income residents who report having a usual source of care (potential access) and having had at least one physician visit in the past year (realized access), as shown in Table 2. The percentage who report having a usual source of care ranges from 54.6% in West Palm Beach-Boca Raton, Fla., to 91.4% in Rochester, N.Y. The percentage who report having had at least one doctor visit in the past year ranges from a low of 56.9% in San Jose, Calif., to 79.5% in the Providence, R.I. area.

The MSAs also vary widely in their community characteristics that are relevant to access for lower-income residents (Table 3). There is substantial variation, of course, in the relative size of populations whose economic or health insurance status increases their reliance on safety-net providers. There is a twofold range in the percentage of all adult residents who are lower income (i.e., with family income up to 250% FPL ranging from 24.1% to 54.9%), and an even larger range in the percentage of the lower-income nonelderly population who are uninsured (ranging from 5.9% to 25.4%) and the percentage with Medicaid coverage (ranging from 2.5% to 19.2%). There are also very wide differences in the size of population groups that disproportionately rely on safety-net providers for reasons related to cultural competence as well as afford-

Table 1. Characteristics of adult population of 54 study MSAs, ages 19–64, 1995–96

	Low- and moderate-income adults[a]			Adults at all income levels
	Uninsured (n = 4,628) % of population	Insured (n = 8,233) % of population	Uninsured and insured (n = 12,861) % of population	(n = 43,914) % of population
Predisposing factors				
Age				
19–39	69.7	60.4	63.4	54.4
40–64	30.3	39.6	36.6	45.6
Gender				
Male	54.8	42.5	46.5	48.9
Female	45.2	57.5	53.5	51.1
Race/ethnicity				
Non-Latino white	44.5	56.3	52.4	69.3
Latino	29.3	15.2	19.8	10.9
African American	18.8	21.5	20.6	13.7
Asian or Pacific Islander	6.2	5.7	5.9	5.3
American Indian/Alaska Native	1.3	1.3	1.3	.8
Education of household head				
Less than high school	26.2	15.0	18.6	8.2
High school graduate	40.1	41.2	40.9	29.0
More than high school	33.6	43.8	40.5	62.8
Marital status				
Single	33.0	28.1	29.7	23.0
Married	51.1	54.1	53.1	64.5
Divorced/widowed	15.9	17.8	17.1	12.5
Recent immigration				
U.S. born	60.8	77.5	72.0	81.4
Immigrant less than 5 years in U.S.	12.0	3.3	6.1	3.2
Immigrant 5 or more years in U.S.	27.2	19.2	21.8	15.4
Enabling factors				
Household income				
Up to 50% of FPL	12.4	9.4	10.4	2.8
51%–100% of FPL	21.0	15.5	17.3	4.7
101%–150% of FPL	26.3	20.6	22.4	6.2
151%–250% of FPL	40.3	54.5	49.9	86.3
Health insurance				
Uninsured	100	0	32.6	17.8
Medicaid	0	19.8	13.3	5.3
Private or other	0	80.2	54.1	76.9
Usual source of care				
No usual source of care	49.8	11.6	24.1	16.7
Need factors				
Health status				
Reporting low health status[b]	20.2	27.4	25.1	16.9
Utilization				
At least one doctor visit	51.8	77.6	69.2	73.5

Source: 1995–96 National Health Interview Survey (NHIS).
[a] Household income up to 250% of federal poverty level (FPL).
[b] "Low health status" (coded 0 = no and 1 = yes); Yes = fair/poor self-rated health status or self-rated activity limitation.

Table 2. Rank ordering of 54 MSAs by potential and realized access, adults ages 19–64 with household income up to 250% of the federal poverty level, 1995–96

Percent having usual source of care[a] (potential access)		Percent having at least one doctor visit[b] (realized access)	
West Palm Beach-Boca Raton, FL MSA	54.6	San Jose, CA PMSA	56.9
Fort Worth-Arlington, TX PMSA	56.8	Jacksonville, FL MSA	57.1
Orange County, CA PMSA	65.0	San Francisco, CA PMSA	57.4
Portland-Salem, OR-WA PMSA	65.2	Chicago-Gary-Kenosha, IL CMSA	59.3
Tampa-St. Petersburg-Clearwater, FL MSA	65.3	Jersey City, NJ PMSA	59.4
San Francisco, CA PMSA	65.7	Los Angeles-Long Beach, CA PMSA	60.0
Riverside-San Bernardino, CA PMSA	66.6	Newark, NJ PMSA	61.5
Los Angeles-Long Beach, CA PMSA	67.0	Riverside-San Bernardino, CA PMSA	61.7
Austin, TX MSA	69.2	Orange County, CA PMSA	62.2
Charlotte-Gastonia-Rock Hill, NC-SC MSA	69.3	West Palm Beach-Boca Raton, FL MSA	63.0
Jersey City, NJ PMSA	69.6	Fort Worth-Arlington, TX PMSA	63.0
Phoenix-Mesa, AZ MSA	70.2	Houston-Galveston-Brazoria, TX CMSA	63.2
Sacramento-Yolo, CA CMSA	70.3	Charlotte-Gastonia-Rock Hill, NC-SC MSA	64.3
San Antonio, TX MSA	72.9	Bergen-Passaic, NJ PMSA	64.5
Seattle-Tacoma-Bremerton, WA CMSA	72.9	Fort Lauderdale-Hollywood-Pompano Beach, FL MSA	65.0
Kansas City, MO-KS MSA	73.2	Greensboro-Winston-Salem-High Point, NC MSA	65.0
Fort Lauderdale-Hollywood-Pompano Beach, FL MSA	73.2	San Diego, CA MSA	65.3
San Diego, CA MSA	74.0	Nassau-Suffolk, NY PMSA	66.3
Memphis, TN-AR-MS MSA	74.0	San Antonio, TX MSA	67.0
Houston-Galveston-Brazoria, TX CMSA	74.0	Austin, TX MSA	67.6
Cleveland-Akron, OH CMSA	74.1	Tampa-St. Petersburg-Clearwater, FL MSA	67.6
Dallas, TX PMSA	74.8	Portland-Salem, OR-WA PMSA	67.6
Atlanta, GA MSA	75.6	Oakland, CA PMSA	67.7
Dayton-Springfield, OH MSA	76.3	Dallas, TX PMSA	67.7
Washington, DC-MD-VA PMSA	76.7	Sacramento-Yolo, CA CMSA	68.1
Albany-Schenectady-Troy, NY MSA	76.9	Kansas City, MO-KS MSA	68.5
Detroit-Ann Arbor-Flint, MI CMSA	77.2	Phoenix-Mesa, AZ MSA	68.7
New York, NY PMSA	77.9	St. Louis, MO-IL MSA	70.4
Chicago-Gary-Kenosha, IL CMSA	78.1	Richmond-Petersburg, VA MSA	70.5
Norfolk-Virginia Beach-Newport News, VA MSA	78.3	Albany-Schenectady-Troy, NY MSA	70.9
Denver-Boulder-Greeley, CO PMSA	79.2	Cincinnati-Hamilton, OH CMSA	71.0
Orlando, FL MSA	79.9	Orlando, FL MSA	71.7
Newark, NJ PMSA	80.0	Denver-Boulder-Greeley, CO PMSA	71.8
Pittsburgh, PA PMSA	80.4	Minneapolis-St. Paul, MN-WI MSA	71.9
St. Louis, MO-IL MSA	81.1	Washington, DC-MD-VA PMSA	72.5
Bergen-Passaic, NJ PMSA	81.8	New York, NY PMSA	73.3
Providence-Fall River-Warwick RI-MA MSA	81.9	Trenton, NJ PMSA	73.4
Cincinnati-Hamilton, OH CMSA	82.0	Dayton-Springfield, OH MSA	73.4
Jacksonville, FL MSA	82.1	Milwaukee-Racine, WI CMSA	74.2
Minneapolis-St. Paul, MN-WI MSA	83.1	Buffalo-Niagara Falls, NY MSA	74.6
Baltimore, MD PMSA	84.1	Seattle-Tacoma-Bremerton, WA CMSA	74.7
Oakland, CA PMSA	84.2	Boston-Lawrence-Worchester, MA CMSA	75.6
Milwaukee-Racine, WI CMSA	84.3	Pittsburgh, PA PMSA	75.7
Philadelphia, PA-NJ PMSA	84.4	Atlanta, GA MSA	76.0
San Jose, CA PMSA	85.1	Detroit-Ann Arbor-Flint, MI CMSA	76.1
Boston-Lawrence-Worchester, MA CMSA	85.2	Norfolk-Virginia Beach-Newport News, VA MSA	77.1
Greensboro-Winston-Salem-High Point, NC MSA	85.3	Salt Lake City-Ogden, UT MSA	77.7
Nassau-Suffolk, NY PMSA	85.8	Cleveland-Akron, OH CMSA	77.8
Columbus, OH MSA	86.8	Memphis, TN-AR-MS MSA	78.0
Richmond-Petersburg, VA MSA	86.8	Philadelphia, PA-NJ PMSA	78.5

Table 2. (continued)

Percent having usual source of care[a] (potential access)		Percent having at least one doctor visit[b] (realized access)	
Buffalo-Niagara Falls, NY MSA	86.9	Columbus, OH MSA	78.9
Trenton, NJ PMSA	89.6	Baltimore, MD PMSA	79.2
Salt Lake City-Ogden, UT MSA	91.0	Rochester, NY MSA	79.3
Rochester, NY MSA	91.4	Providence-Fall River-Warwick RI-MA MSA	79.5

Note: CMSA = consolidated metropolitan statistical area; PMSA = primary metropolitan statistical area.
[a] Percent of MSA residents with household income ≤250% FPL who report having a usual source of care.
[b] Percent of MSA residents with household income ≤250% FPL who report having at least one doctor visit in past 12 months.

ability. These include: the percentage who are noncitizens (ranging from less than 1% to 27.2%); the percentage of lower-income adult residents who are African American (ranging from 1.1% to 41.5%) and Latino (ranging from less than 1% to 51.3%), with corresponding differences also in the non-Latino white populations (ranging from 34.5% to 90.8%).

The extent of support for the low-income population varies greatly across the MSAs (see Table 3). Our index of generosity in Medicaid income eligibility in the state ranges from .09 (the most restrictive) to .34 (the most generous).

The size and role of the health care safety net similarly vary widely. The number of federally qualified health centers in the MSA, the proportion of outpatient visits provided by public hospitals, and the proportion of total outpatient visits in the MSA accounted for by urban teaching hospitals vary from none to very substantial resources and shares of health care services in the study MSAs.

Support provided to the health care safety net also shows very wide variation. For example, average Medicaid payments per enrollee range from $1,029 to $5,579, and average federal grant dollars per lower-income resident paid to community health centers range from 0 to $18.14.[5]

The health care market also varies markedly across the 54 MSAs. The physician-to-population ratio varies from .3 per 1,000 to 6.4 per 1,000. The proportion of the MSA population that is enrolled in HMOs and the index of HMO competition both vary from the lowest level to the highest by a factor of approximately three.

Multivariate Results

The differences in access measures among MSAs are due to both individual- and community-level factors. We used logistic regression to assess the contribution of these different factors.

The Probability of Having a Usual Source of Care

Table 4 reports results of logistic modeling to identify predictors of having a usual source of care among lower-income nonelderly adults in the 54 study MSAs. We have estimated two models, one for uninsured lower-income adults and another for those who reported any type of health insurance, because we hypothesize that the effects of both individual- and community-level factors may differ depending on a person's insurance status. In the preliminary diagnostic stages of developing both models, several of the community-level variables were found not to be significant predictors of the dependent variable; these were excluded from the final regression models.[6]

Individual-level predictors. Noteworthy results for individual-level predictors include the finding that both uninsured and insured residents had only half the relative odds of having a usual source of care if they had immigrated in the last five years (versus if they had lived in the United States longer), and that the relative odds of an insured adult having a usual source of care were no different whether they were covered by Medicaid, or by private insurance or Medicare.

Community-level predictors. Among insured adults, living in an MSA with a higher proportion of low-income uninsured residents slightly reduced the likelihood of having a usual source of care (odds ratio [OR] = .961, $p = .007$), while having a larger proportion of noncitizens in the MSA slightly increased the probability (OR = 1.041, $p = .001$). These two indicators of the size of the safety-net population appear to offset each other, a point to which we will return in the discussion.

For uninsured residents, the relative odds of having a usual source of care were higher in MSAs where Medicaid payments per enrollee were higher (OR = 1.09, $p = .005$), a measure

Table 3. Range of values for community variables, 54 study MSAs

	Range among 54 MSAs[a]
Safety-net population	
% Residents who have low income (≤250% FPL)	24.1–54.9
% Low-income residents who are uninsured	5.9–25.4
% Low-income residents with Medicaid coverage	2.5–19.2
% MSA residents in each ethnic group	
African American	1.1–41.5
Latino	.7–51.3
Non-Latino white	34.5–90.8
% MSA residents who are noncitizens	.7–27.2
Low-income population support	
Medicaid eligibility generosity index[b]	.090–.340
Safety-net services	
% Outpatient visits in public hospitals[c]	.0–66.7
% Outpatient visits in teaching hospitals[d]	.0–85.5
Number of FQHCs per 10,000 residents ≤250% FPL	0–1.5
Safety-net support	
Medicaid payments per enrollee ($) (excluding nursing home payments)	1,029–5,579
Community health center grants per resident ≤250% FPL[e] ($)	0–18.41
Health care market	
MDs per 1,000 population	.3–6.4
HMO penetration[f] (%)	18.5–65.6
HMO competition[g]	.344–.904

Note: Refer to data sources and variable definitions for more information on safety-net community variables.

[a] Total population for the 54 NHIS MSAs ranges from 330,000 to more than nine million.

[b] Medicaid eligibility generosity index higher numbers indicate more generous eligibility. See variable definitions in text for further explanation.

[c] Percent outpatient visits in the public hospital is the total number of visits in the public hospital divided by total number of outpatient department visits among all hospitals in the MSA (AHA 1997).

[d] Percent outpatient visits in the teaching hospital is the total number of visits in the level-4 teaching hospital divided by the total number of visits among all hospitals in the MSA (AHA 1997).

[e] HRSA community health center grants per capita is the dollar amount of the HRSA grant divided by the MSA population of residents ≤ 250% FPL.

[f] HMO penetration rate is the HMO enrollment divided by the total MSA population.

[g] The Index of HMO Competition is calculated by subtracting from 1 the sum of the squared percent of total HMO market share for each of the HMOs operating in a particular MSA. A value close to 1 indicates several nearly equal competitors; a value close to 0 indicates a monopoly.

of state support for the safety net; this suggests that higher reimbursements for Medicaid beneficiaries enable health care providers to also care for uninsured residents. However, insured residents in MSAs with higher Medicaid payments per enrollee did not have significantly higher relative odds of having a usual source of care (OR = 1.083, $p = .132$) than those in MSAs with lower Medicaid payments, suggesting that the level of Medicaid payments does not account for geographic variations in the willingness of health care providers to serve Medicaid beneficiaries.

For insured adults, the only other community-level variable that was significant was the extent of HMO penetration. Low-income adults in MSAs with a higher proportion of residents covered by HMOs were more likely to have a usual source of care (OR = 1.010, $p = .028$), suggesting that HMOs facilitate connecting such adults with health care providers regardless of whether they are covered by Medicaid or private insurance.

It is noteworthy that uninsured Latinos were less likely to have a usual source of care in MSAs with high HMO penetration, the only significant interaction found in these models (see interactions in Table 4). Among uninsured Latinos, Mexicans ($n = 1{,}609$) were the only specific ethnic or racial group that experienced adverse effects relative to whites, particularly in MSAs with high concentrations of poverty, high rates of HMO penetration, and even in areas with high rates of Medicaid reimbursement (data from separate model with Latino subgroups not shown). It is unclear why only Latinos, and particularly Mexican-origin Latinos, experienced significantly more adverse effects because of high rates of low income and HMO penetration; however, the combined effects of these two factors appear to account for the reduced access for Latinos, after controlling for other individual-level factors. This interpretation is suggested by examples of odds ratios for Latinos compared to non-Latino whites in several large MSAs that illustrate different combinations of low-income rates and HMO penetration (see Table 5). Latinos have low odds ratios only in those MSAs with both high proportions of the MSA populations below 250% of poverty and high HMO penetration (e.g., Los Angeles-Long Beach, San Diego, and Riverside-San Bernardino), while they have high odds ratios in MSAs with low rates for both indicators or a high rate for one indicator and a low rate for the other.

Table 4. Multivariate models for having usual source of care, by insurance status, lower-income adults, ages 19–64, 1995–96

	Having usual source of care	
	Uninsured	Insured
Individual-level variables	**Odds ratios**	
Predisposing variables		
Age 19–39 (40–64)	.819*	.670***
Female (male)	1.768***	1.896***
Education (beyond high school)		
Not high school graduate	.756	.810
High school graduate	.923	.803
Marital status (not married)		
Married	1.073	1.405*
Recent immigrant: <5 years in U.S.? (no)		
Yes	.527***	.527***
Ethnicity (non-Latino white)		
Latino	(see interactions below)	1.112
African American	N/S	1.508**
Asian	N/S	1.315
Other	N/S	4.659**
Enabling variables		
Poverty level (151%–250% of FPL)		
≤50%	.811	.878
51%–100%	.961	.887
101%–150%	1.051	.748*
Health insurance (private, Medicare, and other public)		
Medicaid	N/A	1.0
Need variables		
Low health status (not low health status)	1.477***	1.804***
Community variables		
Safety-net population		
% Noncitizen	N/S	1.041**
% Lower income[a]	(see interactions below)	N/S
% Lower-income uninsured	N/S	.961**
Safety-net support		
Medicaid payments	1.094**	1.083
Safety-net services		
Outpatient visits in public hospitals	N/S	.990
Health care market		
HMO penetration	(see interactions below)	1.010*
HMO Index of Competition	.990	.990
Interactions for Latino (white)	**Coefficients**	
Main effect		
Latino	2.00**	N/A
% Lower income[a]	−.0119	N/A
HMO penetration	−.002	N/A
Interactions		
Latino individual + % lower income in MSA	−.02	N/A
Latino individual + HMO penetration in MSA	−.03**	N/A

Notes: Odds ratios adjusted for covariates shown in model; ( ) = excluded category; + = interaction of two variables.
N/A = not applicable in this model; N/S = not significant in development of this model.
[a] Lower income = ≤ 250% FPL.
* $p \leq .05$.
** $p \leq .01$.
*** $p \leq .001$.

Table 5. Multivariate models for having usual source of care for Latinos compared to non-Latino whites, lower-income uninsured adults in selected MSAs, ages 19–64, 1995–96

MSA	% Lower income (<250% FPL)	HMO penetration (%)	OR
Chicago	34.4	23.8	1.818
Houston	45.0	21.5	1.576
San Antonio	49.8	20.6	1.471
New York	50.7	27.1	1.190
Boston-Lawrence-Worcester	28.9	41.9	1.182
Phoenix-Mesa	47.4	33.5	1.050
Riverside-San Bernardino	48.9	40.5	.825
San Diego	44.0	43.8	.823
Los Angeles-Long Beach	52.7	44.0	.688

Note: Odds ratios (OR) adjusted for covariates shown in Table 4.

The Probability of Visiting a Physician in the Last Year

Table 6 shows both the logistic results for uninsured lower-income adults having at least one physician visit in the previous 12 months and the results for insured residents.

Individual-level predictors. After adjusting for health status, age, and gender, insured Asian Americans and Pacific Islanders were less likely than insured non-Latino whites to visit a physician at least once during the year (OR = .677, $p = .008$). Although Latinos overall were not statistically different from whites in their probability of visiting a physician, insured Mexican adults were less likely than comparable whites to report at least one physician visit (OR = .787, $p = .022$; data not shown in table). We did not find such an effect for other populations of color, whether insured or not. Lower-income insured and uninsured residents who did not graduate from high school had lower relative odds of visiting a physician than did those with post-secondary education. Uninsured residents with very low incomes (up to 50% of poverty) had higher relative odds of visiting a physician than did residents with income 150% to 250% of poverty (OR = 1.323, $p = .022$). The finding may be confounded with the use of safety-net providers, higher levels of eligibility for subsidized services, or unmeasured differences in health status. Lower-income residents with Medicaid coverage were more likely than those with other coverage to have visited a physician (OR = 1.284, $p = .011$). Uninsured residents with a usual source of care had two-and-a-half times the relative odds of visiting a physician in the past year (OR = 2.586, $p = .000$), while those who were insured and had a usual source of care had three times the relative odds (OR = 3.127, $p = .000$)—a finding that underscores the importance of this variable as a measure of potential access.

Community-level predictors. Several community-level variables were significant predictors of having at least one physician visit. Uninsured adults were less likely to have visited a doctor if they were living in an MSA with a large proportion of noncitizens (OR = .990, $p = .046$). This finding presumably reflects the increased overall demand on safety-net providers in the area, but it suggests a relationship to this measure of realized access that is the inverse of its relationship to potential access (usual source of care). Insured residents of MSAs with higher Medicaid payments also were more likely to have visited a physician (OR = 1.051, $p = .017$), suggesting that higher reimbursements do increase use of physician services among those with insurance coverage. Finally, both insured and uninsured lower-income residents were more likely to have visited a doctor if they were living in a metropolitan area with a greater number of federally qualified health centers per lower-income resident (uninsured: OR = 1.336, $p = .012$; insured: OR = 1.246, $p = .03$), underscoring the importance of the safety net to all lower-income residents. No interactions were found in these models.

The effect of apparently subtle changes in the odds ratios of continuous community-level variables can be illustrated by the predicted probabilities for the MSAs shown in Table 7. For the average adult in our study, a 10% increase in the proportion of noncitizens living in an MSA would reduce the predicted probability of visiting a physician during the year, on average, by about 3%, assuming all other factors remained unchanged. A 10% increase in the number of federally qualified health centers per 10,000 population would result in a 6% increase in the probability of visiting a physician. Thus, even small changes in the relative odds of community-level

Table 6. Multivariate models for probability of physician visit in 12-month period, by insurance status, lower-income adults, ages 19–64, 1995–1996

	Probability of physician visit in last 12 months	
	Odds ratios	
	Uninsured	Insured
Individual-level variables		
Predisposing variables		
Age 19–39 (40–64)	1.041	.914
Female (male)	2.316***	2.138***
Ethnicity (non-Latino white)		
Latino	.869	.951
African American	1.197	1.083
Asian or Pacific Islander	.891	.677**
American Indian/Alaska Native	.942	1.336
Education (beyond high school)		
Not high school graduate	.756**	.698**
High school graduate	.878	.811*
Marital status (not married)		
Married	1.000	1.051
Recent immigrant: <5 years in U.S.? (no)		
Yes	.980	.677*
Enabling variables		
Poverty level (151%–250% of FPL)		
≤50%	1.323*	1.197
51%–100%	.961	1.271
101%–150%	.861	.970
Health insurance (private, Medicare, and other public)		
Uninsured	N/A	N/A
Medicaid	N/A	1.284*
Usual source of care (no source)		
Has usual source of care	2.586***	3.127***
Need variables		
Low health status (not low health status)	2.664***	3.190***
Community variables		
Safety-net population		
% Noncitizen	.990*	N/S
Safety-net support		
Medicaid payments	N/S	1.051*
Safety-net services		
Outpatient visits in teaching hospitals	1.000	N/S
Number of FQHCs in MSA	1.336*	1.246*
Health care market	N/S	N/S

Notes: Odds ratios adjusted for covariates shown in model; ( ) = excluded category.
N/A = not applicable in this model; N/S = not significant in development of the model for this outcome.
* $p \leq .05$.
** $p \leq .01$.
*** $p \leq .001$.

factors can have important effects on the access of lower-income residents.

Discussion

Several community factors examined in this study influenced access, but they did so differently for the two measures of access used and, for each measure, somewhat differently for uninsured and insured residents. We first address our findings on the safety net and health care market (our second through fourth research questions), and then discuss our findings on the safety-net dependent population (our first research question).

Table 7. Changes in probability of visiting a physician in 12-month period with change in community-level variables, lower-income adults, ages 19–64

MSA	N[a]	Change in probability of visiting physician	
		P_{nc} (%)[b]	P_{hc} (%)[c]
Los Angeles-Long Beach, CA PMSA	1,086	−2.8	6.1
New York, NY PMSA	441	−3.0	6.1
Chicago	203	−3.0	6.2
Riverside-San Bernardino, CA PMSA	183	−2.9	6.1
Houston	161	−3.0	6.1
San Antonio, TX MSA	132	−2.9	5.8
Boston-Lawrence-Worcester, MA CMSA	119	−2.9	5.9
San Diego, CA MSA	115	−3.0	6.2
Phoenix-Mesa, AZ MSA	100	−3.0	6.1
Orange County, CA PMSA	97	−2.9	6.2

[a] N = sample size.
[b] P_{nc} = change in predicted probability of MSA resident visiting physician in last 12 months given a 10% increase in the percentage of MSA residents who are noncitizens.
[c] P_{hc} = change in predicted probability of MSA resident visiting physician in last 12 months given a 10% increase in the number of federally qualified health centers in the MSA per 10,000 residents < 250% FPL.

With respect to our second question about the supply of the safety net, our findings indicate that the extent of the health care safety net has a substantial effect on realized access (but not on potential access), and that the effect does not differ by health insurance status. The probability of seeing a physician during the year is greater for both insured and uninsured lower-income adults in MSAs that have more federally qualified health centers, whose raison d'être is to serve low-income residents. In fact, a 10% increase in the number of health centers per 10,000 such residents results in a 6% increase in the probability that an uninsured adult will visit a physician. This finding that community clinics enhance use of physician services clearly underscores their importance for low-income populations (Forrest and Whelan 2000).

Lower-income residents fare slightly better in MSAs where their state's Medicaid program pays providers more, an important form of direct support for safety-net providers. Our findings show small but significant positive effects on uninsured adults reporting odds of a usual source of care (potential access) and on insured adults with odds of visiting a physician during the year (realized access). The findings suggest that larger Medicaid payments per program beneficiary enable uninsured residents to connect with safety-net providers. Although the size of Medicaid payments does not appear to enhance such connections for insured residents, larger Medicaid payments do promote insured adults' use of physician services. This finding is consistent with the mixed, but generally weak, effects of Medicaid fees on physician participation and volume of physician visits found in other studies (Mitchell 1991; Fanning and de Alteriis 1993; Adams 1994; Coburn, Long, and Marquis 1999). Thus, the answer to our third research question is that the effect of support for the community's safety net varies by health insurance status, with greater support translating into better potential access for the uninsured and better realized access for insured residents.

The finding that insured lower-income adults are more likely to have a usual source of care in communities with greater market penetration by HMOs is consistent with the emphasis in managed care on care coordination and "gatekeeping" by a primary care provider (PCP). Because uninsured residents, by definition, are not enrolled in an HMO, they cannot benefit from this provision. We find no effect of competition among HMOs on either potential or realized access, contrary to some other studies (Cunningham 1999; Cunningham et al. 1999). Thus, the answer to our fourth research question is that greater competition among HMOs in a community's health care market does not appear to have an effect on access of lower-income adults regardless of their insurance status, and that greater HMO penetration benefits those who have health insurance but not the uninsured. The lack of any signif-

icant effect on access to physician services may be due to our use of a fairly blunt access measure: making at least one visit to the doctor in a year.

We now turn to our findings on the effects of the magnitude of the safety-net dependent population—the focus of our first research question. For lower-income adults, living in an MSA with a large population that depends on the health care safety net reduces the relative odds of having a usual source of care. That is, uninsured adults who live in MSAs with a large proportion of lower-income people, and insured adults who live in MSAs with larger proportions of lower-income uninsured residents are slightly less likely to have this connection to health care providers. Having more lower-income residents, especially those who are uninsured, increases the financial burden on safety-net providers, and thus may make it more difficult for these providers to establish connections with adults in the community.

Although living in an MSA with a large proportion of specific populations of color does not affect access, we find relevant results for ethnicity at the individual level. Among the lower-income population of these study MSAs, *insured* African Americans and American Indians/Alaska Natives are statistically significantly more likely than non-Latino whites to have a usual source of care. (The finding for insured Asian Americans and Pacific Islanders was in the same direction but did not reach statistical significance.) *Uninsured* Latinos are more likely than non-Latino whites to identify a usual source of care, but Latinos, and especially Mexican-origin Latinos, do worse in areas with a large low-income population and in areas with high HMO penetration—and this includes some of the nation's largest metropolitan areas in which Latinos are concentrated.

How do we interpret these findings of greater potential access for people of color than for non-Latino whites? First, to the extent that cities have communities of color that are well established, these communities may have developed safety-net systems to meet the needs of their residents to a greater extent than the MSAs' lower-income white residents, who may be more isolated and have fewer support institutions. Second, compared to lower-income whites, people of color may live in more segregated circumstances in most cities (an indicator that was not included in this study). This concentration actually may enhance access to safety-net services if it results in more self-conscious and developed communities. It may increase "social capital" that resides in the quantity and quality of interpersonal ties among people of color (Aday 2001). The value of a community's social capital to individuals is that it enhances residents' ability to achieve in many areas, including going to school, working, and obtaining health care. Such community mobilization of health care resources especially may enable people of color with the financial means (that is, insured residents) to access them. Unfortunately, this mobilization does not appear to benefit those with fewer personal financial resources, with the exception of uninsured Latinos in MSAs that include fewer lower-income residents and lower HMO penetration.

Thus, our findings suggest that the relationship between the relative size of a community's safety-net dependent population and the access of lower-income adults does vary by health insurance status. However, the relationship is very complex, and is mediated by the specific social and economic characteristics of that population. Having a large lower-income population adversely affects insured residents' likelihood of establishing a "medical home," although a large noncitizen population may generate community resources that are partially offsetting. The effect seems to differ by race and ethnicity, perhaps due to greater social capital formation among established communities of color compared to low-income white residents. A large noncitizen population, however, seems to decrease the probability of uninsured residents visiting a physician even once in a year.

Limitations

For some community factors, obtaining measures of the health care and socioeconomic environment that are uniformly available for locales across the country is a considerable challenge. For example, we used data from HRSA for community health centers because it is uniformly available across the nation, but it does not capture information about non-FQHC community clinics. We also used the amount of Medicaid payments to health care providers per enrollee obtained from the Health Care Financing Administration (now the Centers for Medicare and Medicaid Services) because it is readily available for all MSAs; however, it does not include some

important Medicaid payments, such as those for enrollees in Medicaid managed care. The constructed Medicaid generosity index is limited because it is based only on income eligibility; several other aspects of the program may be at least as important, including whether assets are used in eligibility determination, the range of benefits covered, and program outreach and enrollment procedures. The availability of such indicator data would permit studies that could assess the contributions to access of a wider range of factors across many communities (IOM 2000). Such studies could identify factors with broad impact for which public policy interventions might be appropriate.

Although we selected factors that may be measured appropriately at an MSA level, some of the community variables used in this study would be measured more appropriately at a sub-MSA level. In addition to measuring the percentage of MSA residents in each ethnic group, it would be useful to examine neighborhood-level concentrations of particular ethnic groups. Similarly, the effect of health service supply would be measured more precisely at a neighborhood level. The positive findings of this study should encourage additional research to drill down to that level, despite the greater expense of such studies.

Conclusions

Individual-level factors exert a very strong and dominant effect on access to care; however, community factors modify that effect by promoting or discouraging the development of a connection to the health care system by low-income residents and their obtaining needed health services. A number of community factors can be modified by policy and community intervention. The size of the population that must depend on the safety net can be reduced by the federal and state governments expanding Medicaid and SCHIP coverage, and by government and community groups assisting noncitizens to become naturalized and thus qualify fully for Medicaid coverage. Communities can develop and support community health centers, in part with community resources and in part with funding from federal, state, and local governments. State governments can increase their support for the safety net by increasing Medicaid payments to providers. Additionally, a support variable appears to be a significant predictor of each access measure in this study, but results are different for insured versus uninsured low-income adults. The findings of this study confirm that public policies and community environment have measurable and substantial impacts on access to care.

Notes

This study was funded by grant no. 036499 from the Robert Wood Johnson Foundation to the UCLA Center for Health Policy Research as part of the Safety Net Assessment Project (SNAP). Drs. E. Richard Brown of UCLA, John Billings of New York University, and Joel Cantor of Rutgers University were principal investigators of the SNAP. The authors are grateful to Inquiry reviewers whose feedback on an earlier version of this manuscript was used to improve the article.

1 Davidson et al. (2004) present results from a comprehensive literature review and synthesis in this issue of *Inquiry*. The review focuses on community determinants of geographic variation in access among low-income populations.

2 Based on data from the National Governors Association, we developed an index of the "generosity" of each state's Medicaid income eligibility. The index is a composite of income eligibility levels for the respondent's state, weighted for each particular age group's proportion within an applied standardized population, focusing primarily on children and pregnant females. See National Governors Association, October 1997 at www.nga.org/Pubs/IssueBriefs/1997/970930MCHUpdate.asp (7/5/00).

3 Using 1997 American Hospital Association (AHA) data, teaching status for each hospital was created by first forming a ratio for each hospital using the variable for full-time-equivalent medical and dental residents and interns divided by the total number of staffed beds in the hospital, multiplied by 100. Four teaching status levels were determined using this ratio, with major teaching hospitals defined as those with 13 or more full-time-equivalent medical and dental residents and interns per 100 hospital beds. Each hospital was categorized into one of the four levels of teaching status and aggregated by MSA to give the total number and percentage of hospitals in each MSA by teaching status.

4 Data from Uniform Data System, Bureau of Primary Health Care, Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services.

5 Federal grant dollars per low-income resident paid to community health centers is a constructed variable created from the HRSA Uniform Data System. Grants awarded annually by HRSA to the federally qualified health centers is the numerator and the percent of the MSA population below 250% of the federal poverty level is the denominator. The constructed variable ranges from $0 to $18.14 because some of the MSAs in this study had no FQHCs and therefore could not receive grants of this type.

6 The following MSA-level "safety-net population" variables were excluded from the final regression models because they were nonsignificant: percentage residents who are uninsured, percentage low or moderate income residents with Medicaid coverage, income inequity, unemployment rate, percentage African American, percentage Latino, and percentage non-Latino white. Medicaid generosity, a "low-income population support" variable, also was excluded because it measures level of state benefit for children and pregnant women and may not be a valid predictor of nonelderly adult access. Additionally, community health center grants per resident $\leq$250% FPL was not a significant predictor in any of the models for either dependent variable. MDs per 1,000 population, a "health care market" variable, was found not to be significant.

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