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## A Framework for Evaluating Safety-Net and Other Community-Level Factors on Access for Low-Income Populations

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*The framework presented in this article extends the Andersen behavioral model of health services utilization research to examine the effects of contextual determinants of access. A conceptual framework is suggested for selecting and constructing contextual (or community-level) variables representing the social, economic, structural, and public policy environment that influence low-income people's use of medical care. Contextual variables capture the characteristics of the population that disproportionately relies on the health care safety net, the public policy support for low-income and safety-net populations, and the structure of the health care market and safety-net services within that market. Until recently, the literature in this area has been largely qualitative and descriptive and few multivariate studies comprehensively investigated the contextual determinants of access. The comprehensive and systematic approach suggested by the framework will enable researchers to strengthen the external validity of results by accounting for the influence of a consistent set of contextual factors across locations and populations. A subsequent article in this issue of Inquiry applies the framework to examine access to ambulatory care for low-income adults, both insured and uninsured.*

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For more than three decades, health services researchers have investigated the factors that determine an individual's access to medical care. These factors, conceptualized as predisposing, enabling and need, have been used routinely to predict health services utilization and to identify characteristics of people having more or less access (Andersen 1968, 1995). Thus, the underlying theory and supportive empirical evidence are well established for understanding an individual's determinants of access. However, multivariate models containing only individual-level

variables are limited. Most researchers have failed to *comprehensively* account for the effects of contextual variables reflecting the social, economic, structural, and public policy environment in which access occurs. Previously, Andersen and colleagues and other researchers published foundational work in this area, applying a measurement model to investigate "contextual" or community-level determinants of access (Andersen et al. 2002; Cunningham 1999; Cunningham et al. 1999; Grumbach, Vranizan, and Bindman 1997; Cunningham and Kemper 1998; Long

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and Marquis 1999; Lave et al. 1998; Szilagyi et al. 2000; Gaskin and Hoffman 2000; Laditka and Laditka 1999; Laditka and Johnson 1999; Bierman et al. 1999; Roblin 1996; Billings, Anderson, and Newman 1996; Bindman et al. 1995; Billings et al. 1993; Friedman et al. 1999).

This article delineates a more comprehensive range of contextual variables and empirical sources for constructing contextual variables. As an additional contribution, the study distinguishes the effects of contextual variables separately for low-income insured and low-income uninsured populations. The framework suggests the effects of public policy and financing variables and how their influence on provider organizations' delivery of health services leads to different access outcomes for the insured and the uninsured.

Contextual variables for a defined geographic area (e.g., county, metropolitan statistical area [MSA] or state) measure the environment or milieu in which access occurs (Phillips et al. 1998; Andersen and Davidson 2001). The external validity of findings can be strengthened by applying a comprehensive framework and a consistent set of contextual variables to investigate access across locations and populations.

The first objective of this research is to propose a conceptual framework for comprehensively and systematically explaining how individual and contextual variables influence access and access outcomes. As stated previously, the framework suggests contextual variables differentially affect access of low-income insured versus low-income uninsured populations. Second, the framework serves as a guide for constructing contextual variables hypothesized to influence access. The paper concludes by identifying data gaps in measuring safety-net and other contextual variables believed to affect access.

### Summary of the Framework

Figure 1 presents a framework for evaluating the effects of safety-net and other community-level factors on access and access outcomes. The framework consists of three broad domains and related sub-domains. *Individual characteristics*, categorized as predisposing, enabling, and need factors, are the well-established predictors of access. *Community-level variables* capture the characteristics of the low-income and safety-net populations, the structure of the health care market and safety-net services in a geographic area,

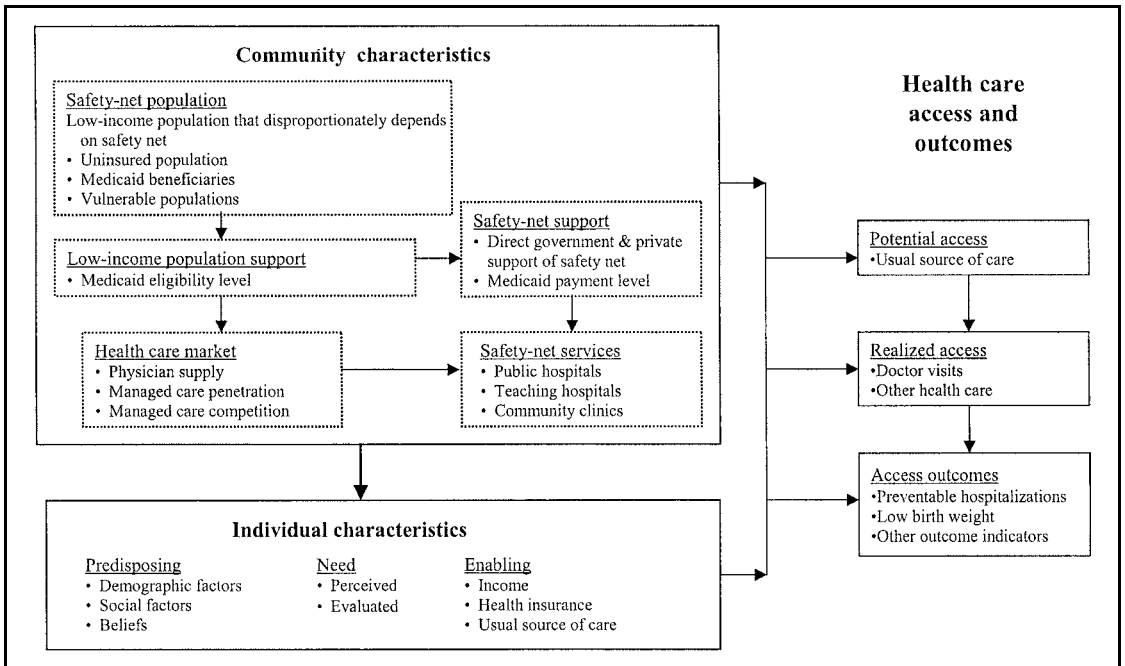
and public policy support for providing services to low-income populations, both insured and uninsured. *Health care access and outcomes* measure potential and realized entry into the medical care system, and the results of access in terms of effective and efficient medical care delivery.

### Individuals' Determinants of Access

Individual-level characteristics are categorized as Andersen's (1968, 1995) predisposing, enabling, and need variables. The model suggests people's use of health services is a function of: their predisposition to use or not use services, even though these predisposing characteristics are not directly responsible for use; enabling conditions that facilitate or impede the use of services; and need, or conditions recognized by lay people or health care providers as requiring medical treatment. More than three decades of research on these factors have resulted in a substantial body of empirical findings that are generalizable across locations and populations. We are not proposing changes to the set of individual determinants.

The literature on predisposing characteristics has shown decreased access to medical care for people with lower educational attainment, the unemployed, ethnic minority groups, especially recent immigrants who speak a language different from the mainstream providers, and people with certain health beliefs (Hulka and Wheat 1985; Guendelman 1991; Portes, Kyle, and Eaton 1992; Becker and Maiman 1983; Mechanic 1979; Tanner, Cockerham, and Spaeth 1983; Forrest and Whelan 2000; Davis, Collins, and Hall, 1999; Leigh et al. 1999). Enabling characteristics associated with under-utilization of medical care include lower household income, having no regular source of medical care, and no health insurance coverage (Andersen and Newman 1973; Manning et al. 1987). Furthermore, economically and socially disadvantaged people are more likely to experience medical symptoms that may not be treated in a timely and effective manner due to less access (Aday and Andersen 1974; Andersen, Kravits, and Anderson 1975; Aday, Andersen, and Fleming 1980; Aday et al. 1985).

After testing and validating results over several decades, definitive information has accumulated on the individual predictors of access. Empirical research has shown individual characteristics account for an estimated 20% to 25% of the variance explained, depending on the access-related



**Figure 1. Conceptual framework for evaluating safety net and other community-level factors on access and access outcomes.**

variable and characteristics of the study population. Yet, a substantial portion of unexplained variance remains.

Similar to the approach Andersen and colleagues have used to validate “individual” predictors of access, we suggest applying a comprehensive conceptual framework including a uniform set of variables to test and validate the “community” determinants of access. Such a strategy will lead policy researchers to the generalizable community determinants affecting access across populations and locations, including factors that may be altered by policy change. From this research, new strategies will emerge for developing evidence-based policy and management interventions to improve access, and a more effective use of public resources.

### Community Determinants of Access

Community variables capture the social, economic, structural, and public policy environment in which access occurs. Specifically, the framework (Figure 1) suggests variables measuring the characteristics of the safety-net population (insured and uninsured), public policy support for low-income and safety-net populations, and the structure of the health care market and

safety-net services within that market. Other variables that can be considered in the framework affect more affluent residents—for instance, the number of hospitals and hospital beds per 1,000 population, the number of physicians per 1,000 population, and economic measures, such as the unemployment rate in a geographic area.

### Safety-Net Population

The safety-net population consists of three broad subgroups of individuals who reside in a geographic location and disproportionately depend on the safety net (IOM 2000): 1) uninsured people, 2) Medicaid beneficiaries, and 3) vulnerable populations.

Geographic variation (defined as differences in access by location, for example, state, MSA or county) in health insurance coverage has been reported for low-income adults and children (Brown, Wynn, and Teleki 2000; Long and Marquis 1999; Cunningham and Kemper 1998), for low-income families (Cantor, Long, and Marquis 1998; Zuckerman et al. 1999), and in the percentages of uninsured people reporting difficulty obtaining medical care (Cunningham and Kemper 1998). MSAs with higher than average uninsurance rates all have large concentrations of immi-

grants, including naturalized citizens and noncitizens; these groups are particularly high in Arizona, California, Florida, New Jersey, New York, and Texas (Brown, Wyn, and Teleki 2000). Geographic areas with the highest uninsurance rates also have the lowest rates of employer-based coverage, higher unemployment and poverty rates, and larger proportions of the population in single-parent households (Brown, Wyn, and Teleki 2000; Holahan, Weiner, and Wallin 1998a). In many communities, having access to employer-sponsored insurance may be more important than the generosity of publicly sponsored programs in determining the proportion of the population that is uninsured. Income or poverty level is often the most important demographic predictor of uninsurance; however, since race/ethnicity and citizenship are correlated with income, sorting out the effects among the community-level variables can be challenging (Marsteller et al. 1998; Weiner and Malakar 1999). Multivariate results examining individual-level race/ethnicity generally have found disparities in access for nonwhite people. By evaluating the community effects of race/ethnicity (e.g., percentage black or percentage Hispanic), researchers will be able to ascertain how residence in a community can either serve as a resource or result in a barrier to an individual's medical care access.

Similarly, among low-income insured residents, we observe geographic variation in the percentages of individuals covered by programs such as Medicaid, and the State Children's Health Insurance Program (SCHIP). The eligibility criteria for these public programs vary by state and depend on the availability of federal and state funds to pay for medical care for low-income people (Norton and Lipson 1998; Brown, Wyn, and Teleki 2000; Bindman et al. 2000; Lillie-Blanton and Lyons 1998; Bronstein and Adams 1999; Adams and Bronstein 1999). Because of the categorical and episodic nature of Medicaid eligibility and changes in state regulations and financing, individuals cycle on and off insurance, often with long spells of no insurance (Short and Graefe 2003; Short, Graefe, and Schoen 2003; IOM 2000; Kasper, Giovannini, and Hoffman 2000; Schoen and DesRoches 2000; Brown et al. 1999; Short 1998; Davis 1996; Short and Lefkowitz 1992; Short, Cornelius, and Goldstone 1990; Short, Cantor, and Monheit 1988). This not

only reduces the continuity of medical care, but also places greater demand on local safety-net providers.

Vulnerable subgroups represent a third category of the safety-net population. Vulnerable populations are those who are economically disadvantaged and whose social or health characteristics increase their risks and need for assistance. Vulnerable subgroups include: adults and children with disabilities; the frail elderly and disabled Medicare beneficiaries; low-income children, pregnant women and adolescents; the mentally ill; substance abusers; HIV/AIDS patients; and the homeless (IOM 2000; Holahan and Liska 1997a; Baxter and Mechanic 1997; Davidson 2004).

Thus, the size and characteristics of the safety-net population vary by geographic area, and these variations affect access and access outcomes. When large groups of low-income people reside in a geographic area, whether they are low-income insured, uninsured, or vulnerable subgroups, they must compete for limited safety-net services and resources. In such high-demand communities, resources may be quickly stretched far beyond what the tax base can reasonably support through special programs or subsidies to public hospitals and clinics (Holahan, Weiner, and Wallin 1998a.). Unlike privately insured patients, low-income uninsured people and those with Medicaid or other public coverage have little financial leverage, few enabling resources, and largely depend on subsidies to obtain care when medical symptoms arise. Providers may not have the incentive or capacity to respond to their demands and needs.

Community-level variables can be constructed to estimate the magnitude of low-income insured, uninsured, and vulnerable subgroups expressed as a percentage of the total population residing in a geographic area. Table 1 provides examples of community-level variables affecting access, and includes safety-net population variables, variable definitions, geographic unit of observation, and suggested data sources for constructing each. The table also shows percentages of low-income uninsured (e.g., nonelderly uninsured, employed, and uninsured), insured (e.g., Medicaid and SCHIP enrollees), and vulnerable populations (e.g., female single-headed households, AIDS incidence rates, immigrant noncitizens, homeless).

**Table 1. Constructing community determinants of access and access outcomes**

Domain and indicator	Variable definitions	Geographic unit of observation	Data sources (examples)
<b>Safety-net population</b>			
Percent low-income, nonelderly uninsured	The numerator for the variable includes those with no reported coverage of any kind during the year, who are also nonelderly (<65 years) and low-income (<250% federal poverty level [FPL]) in a defined geographic population. The denominator includes the total area population.	State, Metropolitan Statistical Area (MSA), county	Bureau of the Census, March Current Population Survey, National Health Interview Survey, California Health Interview Survey
Percent low-income, employed, and uninsured	The numerator for the variable includes low-income (<250% FPL), employed persons who are also uninsured. The denominator is the total population in the defined geographic area.	State, MSA, county	March Current Population Survey, National Health Interview Survey, California Health Interview Survey
Percent Medicaid <sup>a</sup>	The number of individuals ages 0–64, who are both low-income and respond that they had Medicaid any time in the past 12 months, is calculated for each geo-area. The denominator is the total population in the defined geographic area.	State, MSA, county	Bureau of the Census, March Current Population Survey, National Health Interview Survey, California Health Interview Survey
Percent female single-headed households	The numerator for the variable includes the number of unmarried females (age 18+) with children in the household. The denominator includes the total population of households with children residing in a defined geographic area.	State, MSA, county	Bureau of the Census, March Current Population Survey
AIDS incidence rates	The numerator for the variable includes the number of individuals testing positive with HIV/AIDS in the state, MSA, or county population. The denominator includes the total population for the defined geographic area.	State, MSA, county	Centers for Disease Control and Prevention (CDC)

**Table 1. (continued)**

Domain and indicator	Variable definitions	Geographic unit of observation	Data sources (examples)
Percent immigrant noncitizens <5 years in U.S. 5 to 10 years in U.S. >10 years in U.S.	The numerator for the variable includes the number of immigrant noncitizens present in the state or MSA population. The denominator includes the total population for the defined geographic area.	State, MSA, county	March Current Population Survey, National Health Interview Survey, California Health Interview Survey
Percent homeless	The numerator for the variable includes the percent of homeless individuals in a defined geographic area. The denominator includes the total population for the defined geographic area.	City, county, MSA	Data source not available
<b>Low-income population support</b>			
Medicaid generosity index <sup>a</sup>	Medicaid generosity index is calculated based on each state's individual decisions regarding where to set eligibility levels in a given year for its own population given congressionally mandated minimums. The index is an aggregate of income eligibility levels for the state, weighted for each particular age group's proportion within an applied standardized population. <sup>b</sup>	State	National Governors Association; variable constructed by the UCLA Center for Health Policy Research
Medicaid payments per enrollee	Constructed indicator showing 1997 Medicaid per capita payments for all Medicaid recipients and separately for American Indians/ Alaskan Natives	State	Centers for Medicare & Medicaid Services (CMS) – CMS 2082 and CMS 64 forms Calculations were provided by the Indian Health Service <a href="http://www.ihs.gov/nonmedicalprograms/inf/medicaidpc.htm">http://www.ihs.gov/nonmedicalprograms/inf/medicaidpc.htm</a> Refer also to: Finance Working Group Report: The Lewin Report on Medicaid Payments to Hospitals and Related Issues

Table 1. (continued)

Domain and indicator	Variable definitions	Geographic unit of observation	Data sources (examples)
Managed care payments per enrollee	Table 9C in the Uniform Data System, “Managed Care Revenue and Expenses,” provides a breakdown of revenues and expenses by payer category Medicaid, Medicare, other public, private, and total. The numerator can be constructed from this table. The denominator is the number of patients served at the federally qualified health centers (FQHCs) located in a defined geographic area. Another option would be state indicators of average monthly Medicaid managed care rates (Holahan, Rangarajan, and Schirmer 1999).	State, MSA, county	Bureau of Primary Health Care Uniform Data System
<b>Safety-net support</b>			
Per capita expenditures awarded by HRSA to FQHCs	The numerator is annual dollars provided to a community health center to subsidize care for low-income uninsured populations served. The denominator is the number of low-income uninsured persons residing in the defined geographic location.	Federally qualified health centers in a state, MSA, county	Bureau of Primary Health Care Uniform Data System
Disproportionate share hospital (DSH) payment rates	The numerator includes expenditures available to directly subsidize safety-net hospitals in a geographic area. The denominator is the total population of uninsured persons, 0–64, residing in the geographic area.	State	CMS-64 Annual Report
DSH payment rates	Data not available	MSA, county	Data source is not available; would require telephone interviews with state and local health officials and hospital associations.

**Table 1. (continued)**

Domain and indicator	Variable definitions	Geographic unit of observation	Data sources (examples)
State and local grants, and grants from local charities and foundations	The numerator would be the extent of government and philanthropic funding to provide charity care in a defined geographic area. The denominator would be the number of low-income uninsured persons residing in the geographic area.	State, MSA, county	Comparable data are not collected systematically.
<b>Health care market</b>			
Physician supply	The variable measures the number of non-federally employed MDs who provide total patient care per 1,000 population in a geographic area.	MSA, county	American Medical Association (AMA) Physician Master Files contained in the Area Resource File (ARF)
Number of hospital beds per capita	The numerator is the total number of hospital beds in a geographic area. The denominator is the total population size in the area.	MSA, county	American Hospital Association data (numerator); Census Bureau (denominator)
HMO penetration	HMO total enrollment is divided by the total population in a defined geographic area.	MSA, county	Interstudy
Medicaid penetration	2002 indicators are provided for Medicaid enrollment, managed care enrollment, and percent in managed care.	State	CMS <a href="http://www.cms.hhs.gov/medicaid/managedcare/mmcss02.asp">http://www.cms.hhs.gov/medicaid/managedcare/mmcss02.asp</a>
Medicaid managed care penetration	The numerator is the number of individuals enrolled in Medicaid managed care in federally qualified community health centers in a geographic area. The denominator is the total number enrolled in Medicaid in the same area.	MSA, county	Bureau of Primary Health Care Uniform Data System
HMO competition	Competition index is calculated by subtracting from 1 the sum of the squared percent of total HMO market share for each HMO operating in a geographic area. A value of 1 indicates several nearly equal competitors; a value close to 0 indicates a monopoly.	MSA, county	Interstudy



Table 1. (continued)

Domain and indicator	Variable definitions	Geographic unit of observation	Data sources (examples)
<b>Safety-net services</b>			
Number of FQHCs per capita for low-income population	The numerator includes the number of FQHCs in a geographic area. The denominator is the number of low-income ( $\leq 200\%$ FPL) in the area.	MSA, county	Bureau of Primary Health Care Uniform Data System
Percent outpatient department visits in public hospitals	The numerator is the number of outpatient department visits in the public hospital in the geographic area. The denominator is the size of the low-income population ( $\leq 200\%$ FPL) in the geographic area.	MSA, county	American Hospital Association data (numerator); Census Bureau (denominator)
Percent outpatient department visits in a teaching hospital	The numerator is the number of outpatient department visits in the teaching hospital in the geographic area. The denominator is the size of the low-income population ( $\leq 200\%$ FPL) in the geographic area.	MSA, county	American Hospital Association data (numerator); Census Bureau (denominator)
Volume of services provided by local health departments	The numerator is the volume and type of services provided by the local health department in a geographic area. The denominator is the size of the low-income population in the area.	State, MSA, county	State and county health departments

<sup>a</sup> Similar variables can be constructed for percentages of Healthy Families enrollees and/or children enrolled in the State Children's Health Insurance Program.

<sup>b</sup> Since each state sets different eligibility levels for different ages, the standardizing ensures the differences in the index are not based on differences due to age structure of the population, but rather due to variations in the eligibility index within an age group. The index measures how likely a person of a certain age is to be eligible for Medicaid in a particular state relative to other states.

Similar to the Brown et al. study (2004), which appears in this issue of *Inquiry* and applies the conceptual framework, other researchers will need to apply an interactive model to better understand how population, delivery system, and policy and financing variables influence access of individuals *with* and *without* health insurance coverage. A major consideration is the appropriate unit of observation for constructing community-level variables. The research and evaluation questions guide the selection of contextual variables and unit of observation. Ideally, safety-net population variables are constructed at the local level (e.g., county, sub-county, census tract or census block) to capture differences in social and economic conditions in a geographic area. But reliable data are not always available to quantify the characteristics and extent of vulnerable populations. For example, evaluating access to medical care among homeless people is problematic because they are transient, having no permanent residence in a geographic location. On the other hand, AIDS incidence rates are available at the county level and can be used to quantify and compare the size of this vulnerable subgroup residing in geographic areas and the ultimate effects on access and access outcomes.

In summary, the framework suggests that safety-net population variables influence access depending on the percentages of low-income insured, uninsured, and vulnerable subgroups. In large part, the size of the uninsured population is determined by such factors as the generosity of public programs, the extent of employer-sponsored health insurance, and the general economic and market conditions in the community. Further, the magnitude of the low-income population residing in a geographic location translates to more or less competition for limited safety-net services for individuals seeking medical care access. The next section provides the rationale for including "support" variables in the conceptual framework (i.e., the resources available to directly and indirectly pay for medical care for low-income populations [Figure 1]).

#### *Public Policy Support for Safety-Net and Low-Income Populations*

Essentially, support for the medically indigent varies on a community-by-community basis and is influenced broadly by federal legislation and more directly by state and local health policy

and financing (Rajan 1998; Cunningham and Kemper 1998).

Medicaid eligibility and payment levels are established based on congressionally mandated minimums and each state's individual decisions. Medicaid has been a major source of funding for safety-net providers, but the stated goal of Medicaid managed care was to reduce expenditures over time by gradually reducing capitation payments as a percentage of annual per capita costs (Siegel 1996). A twofold variation has been reported in what states pay managed care plans, attributed to fee-for-service reimbursement levels and demographics (Holahan, Rangarajan, and Schirmer 1999). States vary considerably in the numbers of people they cover and the amounts they spend on services (Holahan and Liska 1997b). Some states have higher health risks and others have more expensive resource utilization patterns, not necessarily related to the mix of health problems (Bronstein and Adams 1999; Adams and Bronstein 1999). One study by Cohen (1993) found that low Medicaid fees hamper access to office-based physicians and encourage use of hospital outpatient departments and emergency rooms. Although support for Medicaid languished in the 1990s, more recent data show that the growth in Medicaid capitation expenditures between 1998 and 2001 averaged 18% (Holahan and Suzuki 2003). These increases in Medicaid managed care expenditures have been accompanied by a 2002 initiative launched by the Bush administration that will add a projected 1,200 new and expanded health center sites, and increase the number of people served annually from about 10 million to an estimated 16 million by 2006 (HRSA 2002).

Medicaid eligibility levels influence access to medical care for both the low-income insured and uninsured populations by influencing the subsequent size of the uninsured population in a geographic area. The same is true for other federal and state-funded government programs, such as SCHIP. Historically, Medicaid payments have been used not only to cover program beneficiaries but also to subsidize uncompensated care for the uninsured and to support the safety net. Not-for-profit and public hospitals and federally qualified community and migrant health centers have used Medicaid and Medicare payments to subsidize care for vulnerable subgroups not enrolled in the programs (Davidoff et al. 2000;

Davis, Collins, and Hall 1999; Gaskin and Hadley 1997; Lillie-Blanton and Rowland 1996).

Medicaid disproportionate share hospital (DSH) expenditures are available to support safety-net services in each state (CMS-64 Annual Report).<sup>1</sup> Federal DSH payments through Medicaid and Medicare have been the primary method for states to directly subsidize safety-net hospitals, paying for nearly 30% of unreimbursed care, with state and local subsidies covering another 60% of this care (Fagnani and Tolbert 1999; Fishman and Bentley 1997). But DSH payments are often determined through complex mechanisms (Holahan and Liska 1997b), not directly related to provision of services and care for the poor (Gaskin 1999), and some states have been criticized for using DSH payments in ways Congress never intended (Fagnani and Tolbert 1999). This has prompted Congress to revise the DSH program three times since 1991 (Coughlin and Liska 1998; Holahan and Liska 1997b).

A survey of 40 states examining Medicaid DSH and supplemental payments showed that while the overall size of the DSH program did not grow from 1993 to 1997, the composition of DSH revenues and expenditures changed substantially. A higher share of DSH funds was paid to local hospitals and relatively less was retained by the states (Coughlin, Ku, and Kim 2000). The Balanced Budget Act of 1997 reductions in Medicaid and Medicare payments were expected to lead to further reductions in DSH funds and related bad debt and charity pools (Norton and Lipson 1998; Coughlin and Liska 1998). States have responded in a variety of ways. In Indiana, the financial stability of urban public Level I trauma centers has been described as tenuous due to diminished DSH funds and tax dollars and high proportions of uninsured and underinsured patients (Selzer et al. 2001). In California (1997–99 data), public hospitals were able to increase their profits from pediatric and neonatal intensive care units (ICUs), and DSH hospitals located in markets with high HMO penetration reduced their operating losses in nursery and pediatric services (McCue 2002). In Colorado, legislators responded to the reductions in DSH payments by creating a Medicaid re-financing strategy so that major teaching hospitals could enhance their teaching programs and at the same time meet the needs of low-income patients (Vancil and Shroyer 1998).

Managed care capitation in a competitive com-

mercial market also restricts hospitals' ability to shift costs to private payers. At the same time, subsidies from local and state governments to pay for indigent care are declining, making it more difficult for safety-net organizations to care for the uninsured (Fagnani and Tolbert 1999; Norton and Lipson 1998; Cunningham and Tu 1997). Increasingly, communities have relied on local charity and foundation funding to create a patchwork of services and programs to provide care for vulnerable populations (Brown and Dallek 1990; Davis, Collins, and Hall 1999; Felland and Lesser 2000). In addition to state and local grants, Medicaid, and Medicare, other funding for community health centers is available through private insurance, patient fees, and annual grants from the Health Resources and Services Administration (HRSA). Many safety-net hospitals would not be economically viable without large public subsidies because of the gap between operating revenue and operating expenses. The size of the gap varies substantially among geographic areas, as does the extent to which it is covered by local, state, or federal funding sources (Meyer et al. 1999).

Many are concerned that care for uninsured people and the viability of the safety net are in jeopardy. This is due to welfare reform, changing eligibility levels, restrictions on entitlement of noncitizens, changes in Medicaid payments, Medicaid managed care competitive contracting (Lipson and Naierman 1996; Norton and Lipson 1998; Ellwood and Ku 1998; Baxter and Feldman 1999; IOM 2000), and most recently the downturn in the U.S. economy and diversion of federal funds to other priorities. The Institute of Medicine (IOM 2000) and others have emphasized the importance of community attitudes in shaping government's response to providing access for the low-income uninsured, although few empirical studies were found on the topic (Baxter and Feldman 1999; Baxter and Mechanic 1997).

As suggested in the framework (Figure 1), community-level variables can be constructed to operationalize support variables as "low-income population support" and "safety-net support" variables. Table 1 suggests support variables, variable definitions, geographic unit of observation, and data sources for constructing each. Examples of support variables include Medicaid eligibility levels and Medicaid payments. Medicaid eligibility levels, which benefit the low-income insured population, are measured by constructing a

“Medicaid generosity index,” using state-level data from the National Governors Association (Brown et al. 2004). Medicaid payments per recipient and/or Medicaid managed care payments per recipient can be constructed to measure resources expended through HRSA-funded federally qualified health centers. State indicators of Medicaid spending per enrollee excluding long-term care can be constructed using data from the Centers for Medicare and Medicaid Services (CMS-2082 and CMS-64 Annual Report).

The framework suggests both Medicaid beneficiaries and low-income uninsured individuals stand to benefit in areas where state Medicaid payments are higher—the latter because safety-net providers have greater flexibility to subsidize care for the uninsured. However, when Medicaid managed care has greater penetration in a market area and payments per recipient are lower, safety-net providers will have fewer resources to subsidize care for low-income uninsured individuals, leading to measurable declines in access for the uninsured, as well as for Medicaid beneficiaries.

Safety-net support variables, including grants awarded annually by HRSA to the federally qualified health centers, can be constructed as dollars per capita using the Bureau of Primary Health Care Uniform Data System. Medicaid DSH expenditures are available for each state. However, tracking the funds distributed at the MSA or smaller geographic area is more challenging, requiring telephone interviews with state and local health officials and hospital associations. No systematic data have been collected on funding provided to safety-net providers from state and local government grants and/or grants from local charities and foundations to subsidize care for the uninsured. The majority of research results on safety-net support variables have emerged from qualitative studies (Holahan, Weiner, and Wallin 1998a; Katz and Thompson 1996; Ullman, Bruen, and Holahan 1998; Meyer et al. 1999; Rajan 1998; Coughlin and Liska 1998; Gold, Sparer, and Chu 1996; Summer 1998; Norton and Lipson 1998; Baxter and Feldman 1999; Lipson and Naierman 1996; Baxter and Mechanic 1997; Steinberg and Baxter 1998), with few multivariate studies to corroborate findings. Efforts to strengthen the results using multivariate methods will require further methodological work to construct quantifiable indicators for support variables. Collecting and monitoring this information could prove to be ex-

pensive and time consuming. Nevertheless, policy researchers should creatively and rigorously attempt to construct support variables so data-driven policy and management interventions can be based more fully on evidence.

### *Health Care Market and Safety-Net Services*

Figure 1 shows that the final categories of community-level variables are “health care market” and “safety-net services,” which influence access in a geographic area. This section explains the rationale for including delivery system variables in the conceptual framework. These market and delivery system factors influence the medical care access of the general population, as well as those who depend on safety-net services (Figure 1). Health care market variables present the generalized depiction of the delivery system in a defined geographic area (e.g., physician supply, number of hospital beds per capita, and managed care penetration and competition). While the majority of middle-income and affluent Americans use mainstream medical care providers, the safety net serves a disproportionate number of poor and uninsured people (IOM 2000; Cunningham and Tu 1997; Lefkowitz and Todd 1999).

As discussed previously, the Institute of Medicine defines core safety-net providers (IOM 2000) as those who organize and deliver a significant level of health care and other related services to uninsured, Medicaid, and other vulnerable patients. In most communities, there is a subset of “core safety-net providers” that show two distinguishing features: 1) either by legal mandate or explicitly adopted mission, they maintain an “open door,” offering access to services for patients regardless of their ability to pay; and 2) a substantial share of their patient mix is uninsured, Medicaid, and other vulnerable patients.

The core safety-net providers delivering care to low-income populations include a varying mix of public hospitals, urban teaching hospitals (Gaskin 1999; Gaskin and Hadley 1997; Siegel 1996; NAPH 2001), not-for-profit hospitals with a charitable care mission (Baxter and Feldman 1999), physician offices (Forrest and Whelan 2000), federally qualified and other community health centers (Davis, Collins, and Hall 1999; NACHC 2001), and local health departments (Wall 1998; Martinez and Closter 1998). Forrest and Whelan (2000), in a recent study of access in different provider organizations using three

national databases, concluded that: 1) expanding community health centers likely will improve access to primary care for vulnerable populations; 2) enhancing access to physicians' offices is needed to bolster the safety net; and 3) the greater service intensity and poorer continuity for primary care in hospital outpatient departments raise concerns about the suitability of these clinics as primary care sites.

Market dynamics influence access as well. Intense price competition arising from commercial managed care penetration and the rapid growth of Medicaid managed care have contributed to an increasingly hostile health care environment. Competitive bidding for Medicaid contracts became increasingly attractive to the for-profit sector, particularly in areas with high managed care penetration. When commercial contractors are granted Medicaid contracts, safety-net providers stand to lose market share (Holahan, Weiner, and Wallin 1998b; Gaskin 1998; Davis, Collins, and Hall 1999; Siegel 1996). Higher commercial HMO penetration has been associated with lower patient volumes in minority hospitals (Gaskin 1997), and smaller profit margins with less excess in operating budgets to subsidize care for uninsured people (Cunningham 1999; Center for Studying Health System Change 1998, 1999; Lillie-Blanton and Rowland 1996; Cunningham et al. 1999).

However, due to declines in financial performance, evidence has shown commercial plans are exiting the Medicaid market in many states (McCue et al. 1999; Gray and Rowe 2000). Health plans also have been created by safety-net organizations, consisting of community health centers, public hospitals, and urban teaching hospitals (Gray and Rowe 2000; Baxter and Feldman 1999; McCue et al. 1999; Holahan, Rangarajan, and Schirmer 1999). Unfortunately, Gray and Rowe (2000) recently concluded even the most stable safety-net health plans live on the edge of financial disaster—in 1997, 60% lost money, 8% broke even, and only 32% generated a surplus.

Urban Institute researchers have used data from case study interviews to develop typologies that characterize the network of safety-net providers at the community level (Holahan, Weiner, and Wallin 1998a; Norton and Lipson 1998). But these are largely descriptive case studies that should be supplemented with multivariate studies

to ascertain the extent to which the structure of provider networks affect safety-net performance and access. The Figure 1 framework can be used to construct a consistent set of quantifiable variables reflecting the health care market and safety-net services in a geographic area. As noted earlier, health care market variables include physician supply, hospital beds per capita, HMO penetration and competition, and Medicaid managed care penetration. Suggested safety-net services variables are the number of federally qualified health centers per capita for the low-income population, percentage of outpatient department visits in public and teaching hospitals, and services utilized in local health departments. However, no systematic database exists on the extent of services provided to low-income patients by private physician offices. Physician supply is at best a crude indicator; a better indicator would be the number of primary care physicians who accept new Medicaid patients, but such a variable currently is not readily available. At the moment, these data would be expensive to construct and beyond the scope of the present study. In the future, as states and associations within states become more sophisticated in collecting industry data, structural information may become more available on HMOs, hospitals, health systems, and physician supply.

### Health Care Access and Outcomes

Access indicators measure potential and realized entry into the primary care system. *Potential access* is indicated by the enabling variables. More enabling resources provide the means for, and increase the likelihood that use will take place (Andersen and Davidson 2001). Indicators of potential access include having a regular source of medical care and health insurance coverage (Figure 1). *Realized access* is the actual use of services. Realized access dependent variables focus on entry into the primary care system, such as actual utilization of physician services, delay in seeking treatment, and late or no prenatal care (Figure 1). In this issue of *Inquiry*, Brown and colleagues (2004) investigate the community and individual determinants of access to ambulatory care predicting potential (having a regular source of care) and realized (at least one doctor visit in the past 12 months) access among lower-income adults residing in 54 large urban areas.

Access outcomes measure the extent to which effective and efficient access is achieved once the

individual enters the system. The Institute of Medicine Committee on Monitoring Access to Medical Care defined access as: the timely use of personal health services to achieve the best possible health outcomes (IOM 1993). This definition relies both on the use of health services and health outcomes as yardsticks for judging whether access has been achieved (Andersen and Davidson 2001). The resulting measures are referred to as effective access. Indicators of efficient access are similar to measures of effective access with the added emphasis on measuring resources used to influence outcome. Efficiency is achieved by improving health outcomes, while minimizing resource requirements (Andersen and Davidson 2001). Examples of access outcomes include preventable hospitalization rates and relative risks (Billings, Anderson, and Newman 1996; Bindman et al. 1995; Gaskin and Hoffman 2000), hospital use rates for ambulatory care sensitive conditions (Billings et al. 1993; Friedman et al. 1999; Laditka and Laditka 1999; Bierman et al. 1999), and hospital use rates for high-risk and complicated deliveries (Laditka and Johnson 1999).

## **Discussion and Conclusions**

This paper suggests a framework for analyzing the community determinants of access. The framework builds on the extensive research pioneered by Andersen and colleagues over the past several decades. Similar to the approach they used to validate the "individual" predictors of access, this paper suggests applying a comprehensive conceptual framework including a uniform set of variables to test and validate the "community" determinants of access. The framework suggests community variables differentially affect access of low-income insured versus low-income uninsured populations. The framework serves as a guide for constructing contextual variables hypothesized to influence access. Data sources are suggested and guidance provided on how to construct contextual variables including the most appropriate geographic unit of observa-

tion. The paper discusses data gaps in measuring safety-net and other community variables believed to influence access.

In the research literature, "safety-net population" characteristics have been found to be the most widely measured and analyzed in multivariate studies. The majority of research results on public policy "support" variables have emerged from descriptive and case study methods, with few multivariate studies to corroborate findings. Without a doubt, most data gaps exist for the "support" variables because funding to support safety-net providers is complex and varies for each safety-net provider, community, and state. Other than Medicaid funding, systematic data may not be readily available on other state and local government and private funding sources. Nevertheless, strategies are suggested for operationalizing support variables to advance the research (Table 1). The framework suggests that more comprehensive measures of "health care market" and "safety-net services" can be constructed to evaluate access for low-income insured, uninsured, and vulnerable populations. The adverse effects of market competition and managed care penetration on access, whether commercial or Medicaid managed care, have been reported in the literature. However, the most recent MSA-level study examining 22 major U.S. cities reported that higher HMO penetration rates were associated with fewer access problems (Hendryx et al. 2002). One unique contribution of the Hendryx et al. study was that it included "social capital" variables in the analysis, showing that people who live in MSAs featuring higher levels of social capital report fewer access problems.

The comprehensive and systematic approach suggested by the framework will enable policy researchers to strengthen the external validity of results by accounting for the influence of a consistent set of contextual factors across locations and populations. A subsequent article in this issue of *Inquiry* applies the framework to investigate access to ambulatory care for low-income adults, both insured and uninsured (Brown et al. 2004).

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## **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 the Inquiry reviewers who critiqued earlier versions of this*

manuscript. Their comments contributed to major improvements in the article, especially related to the effects of contextual variables on low-income insured and uninsured populations.

1 The Quarterly Medicaid Statement of Expenditures for the Medical Assistance Program (Form CMS-

64) is the accounting statement which states, in accordance with 42 CFR 430.30(c), must submit each quarter under title XIX of the Social Security Act (the Act). It shows the disposition of Medicaid grant funds for the quarter being reported and previous fiscal years, the recoupment made or refunds received, and income earned on grant funds.

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