
Research Brief

The Role of Uninsurance and Race in Healthcare Utilization by Rural Minorities

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Objective. To examine the independent effects of minority status, residence, insurance status, and income on physician utilization, controlling for general health status and the presence of acute or chronic health problems. Of special interest was the question of utilization differences among rural minority populations, as compared with urban non-Latino whites.

Data Source. Data from the 1992 National Health Interview Survey (NHIS).

Study Design. Multivariate analyses used multiple logistic regression methods to detect independent effects of residence and minority status on whether or not individuals used physician services.

Data Collection/Extraction Methods. Data were obtained from the National Health Interview Survey, 1992. The survey included information about the race/ethnicity of the respondent, health status, utilization of services, insurance status, and socioeconomic status.

Principal Findings. The most salient determinant of utilization of healthcare services is insurance status, regardless of race/ethnicity or (rural or urban) place of residence. Racial and ethnic minorities were less likely than whites to use physician services, and use was generally lower for rural residents. The most striking differences were for rural Latinos and rural Asians/other persons.

Conclusions. Although the results demonstrate a need to adjust policies designed to improve utilization by accounting for particular problems faced by minority populations, they also demonstrate the primacy of addressing financial access.

Key Words. Rural health, insurance, utilization, access, minority health

In the absence of national health reform, incremental approaches to resolving problems of access to medical services are once again being considered. Various state governments have adopted policies to create purchasing alliances of small employers, to expand Medicaid programs (11 15b waivers), or to use high-risk pools for providing insurance to those excluded from insurance purchase because of preexisting conditions. In 1996, the U.S. Congress passed

the Kassenbaum-Kennedy legislation—the Health Insurance Portability and Accountability Act—which assures portability of plans across groups and into the individual market, limits preexisting conditions clauses, and establishes tax deductibility for long-term care insurance premiums. Others have suggested using the federal authority created by the Employment Retirement Income and Security Act (ERISA) to encourage more employers to provide health insurance benefits. While important, the lack of health insurance is not the only, and may not be the prominent, reason for limited access to medical care. Place of residence, especially in health professional shortage areas, creates access problems, as do cultural differences between residents and healthcare providers. Therefore, incremental approaches to dealing with access issues must address problems other than health insurance. Statistical models that test for the relative contributions of various potential barriers can help in the development of policies that might have an optimal effect on improving access. This article presents one such model, comparing the separate and combined effects of insurance, minority status, and residence on access.

In order to improve our understanding of differences in healthcare utilization by population subgroups, the focus of the research reported in this article is on minority populations (African American, Latino, Asian, and other) residing in non-metropolitan areas. Other studies have reported the barriers to utilization that are related to insurance status, income, and race. This study expands the scope of inquiry to include race/ethnicity combined with rural residence. This study also tests relationships across individuals grouped by health condition.

CONCEPTUAL DEVELOPMENT

The dependent variable of interest here is utilization of medical services, operationalized as doctor visits. Utilization is a proxy for access in this model, representing the action taken when access is not a problem. This is a common research approach (Braden and Bearegard 1994; Aday and Andersen 1974;

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Newacheck 1989), albeit a somewhat problematic one because persons with severe healthcare needs might, out of absolute necessity, overcome access problems to utilize the delivery system, and those with few barriers related to access may be infrequent users due to satisfaction with their health condition. These potential problems are customarily treated by including health status in multivariate models. This is the approach we use in this article. Although we agree with Lambrew and colleagues (Lambrew, DeFries, Carey, et al. 1996) that the mean number of physician visits per year is not necessarily an indicator of appropriate utilization, our solution is to use a dichotomous measure: seeing, or not seeing, a physician during the previous 12 months. The dichotomous variable is selected rather than the total number (or mean number) of physician visits during 12 months, because the latter could be influenced more by a health condition than by general problems of access. That is, a high frequency of physician visits is likely to indicate the presence either of a serious episode of acute illness or a chronic condition for which the need to see a physician might overwhelm the financial and geographical barriers we are examining.

Three potential barriers to access are considered in this research. Many studies have shown financial access to be a problem for millions of uninsured Americans. Being without any form of health insurance often restricts a person's ability to pay for services, which can become a barrier to seeking treatment and at times a barrier to receiving it (Weissman et al. 1991; Hafner-Eaton 1993; Braveman, Oliva, Miller, et al. 1988; Braveman, Oliva, Miller, et al. 1989; Weissman and Epstein 1989; Berk, Schur, and Cantor 1995; Hafner-Eaton 1994; Spillman 1992). Even persons with health insurance may experience difficulties with financial access if their coverage does not extend to specific services or if deductibles are set at levels beyond their means to pay (Hayward et al. 1988; Shulman, Martinez, Brogan, et al. 1986; Hubbell, Waitzkin, and Rodriguez 1990).

A second barrier to access may be a lack of providers in close proximity to persons in need. This is most typically a problem for residents of rural communities, although it can also be a problem for residents of central cities in large metropolitan areas (Miller, Holahan, and Welch 1995; Clarke et al. 1995). Having to travel long distances to a provider can become a reason not to seek care even when it may be needed. Even if providers are nearby, restricted choice because of the small numbers of providers may be an access barrier to persons not wanting to use the local provider. For example, a professional of a different nationality may not be "accepted" in a small rural community.

The third potential problem in access is cultural barriers. These can include language problems between patients and providers, and communication problems that result when providers suggest a treatment regimen that is inconsistent with the patient's culture or when a patient cannot communicate a symptom to the provider because of cultural taboos. As a general measure of these cross-cultural difficulties, members of minority groups have been shown to have lower utilization than whites (Escarce et al. 1993; Gornick, Eggers, Reilly, et al. 1996; Cornelius 1991; Friedman 1994).

Variables other than these measures of access influence utilization. Certainly healthcare status is a predictor of use of hospital and/or physician services. There may be different patterns of use among those with illnesses, depending on whether the adverse health condition is an acute episode or a chronic problem. A chronic condition may lead to periodic use of hospital or doctor services—or in some years to no use of such services because the routine use of medications has stabilized the condition. Thus, there are three categories of health conditions warranting consideration: (1) no presence of adverse conditions, (2) acute illness, and (3) chronic illness.

Socioeconomic conditions also influence the use of services. Low family income can precipitate lower utilization, particularly among households with no health insurance or inadequate coverage. Age may be associated with utilization if adverse health conditions among younger persons are more easily treated without the aid of a health professional. Education may have a positive bearing on utilization.

Characteristics of the population can influence utilization either directly or through an interaction with the healthcare delivery system (Aday, Andersen, and Fleming 1980). The characteristics of the population include predisposing conditions (including belief systems), enabling conditions (including financial circumstances), and need conditions (including general health status and specific health conditions). We have drawn from this conceptual framework to identify the variables included in our model, since utilization is the dependent variable being examined. Region and rural/urban serve as proxies for system characteristics, race/ethnicity for predisposing conditions, characteristics of the person and household for predisposing and enabling conditions, and health status/health conditions for need characteristics. In a 1993 volume, Aday (1993) offers an enhancement of this model through special consideration of the effects of being a part of a particular population group. For the purpose of this research, that emphasis is repeated through a special focus on minority populations in rural areas. Our principal hypothesis is that certain population groups (rural African American, Latino,

Asian, and other) will be less likely to use healthcare services than urban whites, controlling for other population and system characteristics.

METHODS

This article uses data from the 1992 National Health Insurance Survey (NHIS) available from the National Center for Health Statistics (NCHS). The NHIS uses a complex multistage probability sampling, with the methodological goal of achieving the most representative sample possible in terms of age, race, and residence. The 128,412 persons in the sample are from 49,401 households that represent the non-institutionalized civilian population of 219 million persons living in the United States at the time of the survey. This research examines the population under age 65, with 112,246 persons in the sample. The response rate for the basic data set in the survey was 95.7 percent (Benson and Marano 1994).

The analysis for this project was conducted with SAS version 6. SAS was used to evaluate the distributions of variables of interest, to generate simple bivariate analyses, and to develop multivariate models for the purpose of specifying variables and measuring odds ratios. SUDAAN software was then used: PROC LOGIT, to determine standard errors and confidence intervals. SUDAAN was needed to adjust for the design effects from the complex sampling framework of the NHIS when estimating standard errors (Massey et al. 1989). We report the probability estimates obtained from the SUDAAN analysis in this article, which includes the accurate estimation of standard errors and confidence intervals.

The *dependent* variable, utilization, is operationalized as using, or not using, physician services during the previous 12 months. The *independent* variables were operationalized as follows:

- *Financial access.* Some form of health insurance versus no insurance.
- *Geographical access.* Rural, combining non-MSA non-farm and non-MSA farm; and urban, combining central city and non-central city. This measure of rural-urban allows for maximizing cell sizes for minority populations in rural areas, while preserving geographic distinctions that may matter in examining access and utilization. The metropolitan/non-metropolitan distinction is useful for understanding general rural-urban differences, but more refined distinctions might follow if this initial measure is related to the phenomenon of interest:
- *Cultural access.* Four ethnic groups are compared: non-Latino white, non-Latino African American, Latino, and Asian/other.

- *Health status.* Self-reported health status is excellent, very good, good, fair, or poor.
- *Health conditions.* The NHIS-coded acute conditions is combined and coded either as acute conditions present or not present, the same strategy used for NHIS-coded chronic conditions.
- *Socioeconomic variables.* Income is a categorized variable in the NHIS survey, measured as greater or less than \$20,000 per family per year; family size is the number of persons in the primary family unit; age and education are continuous variables, in years.

Descriptive statistics were generated to show differences among groups of persons, based on the combination of health condition, minority status, and geographic residence. Multiple logistic regression was used to test the multivariate model. (This technique is appropriate when the range for the dependent variable is set as 0 or 1) (Long 1997). Other possible techniques, including probit and the weighted linear probability model, did not share that restriction of values for the dependent variable. Logistic regression, with both SAS and SUDAAN software, provided a measure of the likelihood of having the characteristic in question, in this case, use of a physician, defined as an odds ratio versus a predetermined comparison group. The fit of the model (all variables simultaneously) was assessed at $p < .0001$. The needed dummy variables in this analysis were generated for each categorical variable by the reference group method, as indicated in the tables. For this analysis, we chose urban white as the comparison group among the possible combinations of populations. For other variables, we consistently chose the "favorable" state as the comparison, for example, "insured" and "excellent health," with "well" as the health condition.

RESULTS

Tables 1a and 1b represent summary characteristics of the population groups. The data are consistent with expectations that are based on aggregate data from other sources, such as vital statistics. That is, since life expectancy is generally longer for whites, the whites in all subtables are older than the other populations. Education levels are higher for whites and Asians/others. The percentage uninsured is lowest among the whites, and highest among the Latinos. These characteristics are presented for purposes of general information to confirm the validity of the categories as evidenced by meeting expectations of differences among them.

Table 1: Summary Characteristics for All Non-Elderly, and Chronic, Acute, and Well Subpopulations in Rural and Urban Sectors by Ethnicity, United States, 1992, Rural and Urban

Characteristic (Number)	Chronic			Acute			Well					
	W† (6,555)	B (621)	L (346)	A (145)	W (1,267)	B (114)	L (100)	A (29)	W (11,739)	B (1,478)	L (899)	A (470)
Age (mean, years)	37.5	35.2	29.8	35.2	20.6	16.1	19.0	20.2	27.3	21.8	21.1	21.9
Education of Household Head (mean, years)	13.1	11.8	11.4	12.5	13.4	11.4	12.1	13.6	13.3	14.2	10.7	12.7
Family Size (average number of persons)	3.1	3.7	3.8	3.6	3.7	4.1	4.3	4.0	3.6	4.3	4.5	4.6
Number of Physicians Visits*	6.6	7.7	6.0	7.8	4.6	3.4	3.1	3.6	1.2	1.7	1.6	1.5
Number of Conditions (average)	1.9	2.0	1.5	2.2	1.2	1.1	1.0	1.1	0	0	0	0
Percent Uninsured	16.7	26.9	32.7	25.0	15.8	20.7	33.6	30.1	17.6	28.9	36.0	26.5

Characteristic (Number)	Chronic			Acute			Well					
	W† (18,292)	B (3,936)	L (4,329)	A (828)	W (3,813)	B (685)	L (1,051)	A (182)	W (33,601)	B (8,781)	L (10,396)	A (2,589)
Age (mean, years)	36.7	34.1	32.2	36.8	22.4	21.3	17.5	22.5	28.1	23.7	22.0	27.0
Education of Household Head (mean, years)	14.0	12.7	11.9	14.3	14.3	12.9	12.0	14.5	14.2	13.0	11.5	14.0
Family Size (average number of persons)	3.0	3.2	3.8	3.4	3.5	3.6	4.3	3.6	3.5	3.8	4.5	4.0
Number of Physicians Visits*	7.7	7.9	7.1	7.8	4.4	4.5	3.9	3.9	2.2	2.0	1.9	1.8
Number of Conditions (average)	1.8	1.9	1.5	1.6	1.1	1.1	0.9	1.01	0	0	0	0
Percent Uninsured	11.7	18.6	29.7	19.3	10.5	17.2	25.7	17.7	12.9	21.0	36.0	22.2

* Previous 12 months per respondent.

† W=Non-Latino white; B=Non-Latino African American; L=Latino; A=Asian/other.

Findings from the logistic model are presented in Table 2. Among the variables of interest in this study—race, insurance, and residence—insurance has the greatest association with utilization. The uninsured were 60 percent less likely (odds ratio = 0.4) to use services than were the insured. All racial groups and rural whites were less likely to have seen a physician during the previous 12 months than were urban whites. The most striking differences, as compared to urban whites, were for rural Latinos (0.7 times as likely) and rural Asian/other (0.6 times as likely). The combination of minority status and rural residence is uniquely related to lower utilization of physician services. Other variables in the model performed as expected. In particular, ill health, whether reflected in self-reported assessment or as the presence of chronic and acute health conditions, increased the odds of visiting a physician. The socioeconomic variables had very little independent effect. There were only modest differences from one region of the country to another. Sex was an important indicator, with males less likely to utilize the system.

Insurance status and race/ethnicity each lower significantly the odds of seeing a physician during the previous 12 months. As evident in the initial tables showing distribution of characteristics across population groups, these two variables are related. What, then, is the effect of being both uninsured and a member of a population at risk? A model was tested that included interactive terms of race/ethnicity and insurance status. None of the resulting cells contained fewer than 166 cases; three had fewer than 450, and three others had fewer than 1,000. As evident in Table 3, the influence of insurance status, combined with the characteristics of residence and ethnicity, lowers considerably the likelihood of seeing a physician. What is especially interesting, though, is that rural residence actually lowers the likelihood that the uninsured saw a physician during the previous 12 months (except for Latinos), but has the opposite effect for the insured. Perhaps the rural “safety net,” which often relies on local primary care physicians, is more effective, albeit still inadequate, in rural areas.

CONCLUSIONS

This study corroborates the results established in the literature regarding the significance of insurance to utilization. The insured person is twice as likely as the person without insurance to use a physician’s services. Compared with the urban white population, all other ethnicity-residence subgroups are less likely to use the physician. Asian/other and rural African American groups are the

Table 2: Logistic Regression Model Predicting Physician Visit in Previous 12 Months; NHIS 1992, Persons Under Age 65

<i>Characteristics</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>p-Value</i>	<i>Odds Ratio (OR)</i>	<i>95% C.I. for OR</i>
<i>Constant/Intercept</i>	1.805	0.096	.0000	6.079	5.017–7.366
<i>Insurance Coverage</i>					
Insured (reference group)					
Uninsured	–0.864	0.025	.0000	0.422	0.401–0.443
<i>Age</i>	–0.022	0.001	.0000	0.978	0.977–0.979
<i>Education of Household Head</i>	0.071	0.005	.0000	1.073	1.063–1.083
<i>Gender</i>					
Female (reference group)					
Male	–0.654	0.018	.0000	0.520	0.501–0.539
<i>Residence and Race/Ethnicity</i>					
Urban White (reference group)					
Urban African American	–0.480	0.037	.1949	0.953	0.886–1.025
Urban Latino	–0.101	0.036	.0065	0.904	0.841–0.971
Urban Other	–0.318	0.067	.0000	0.728	0.637–0.832
Rural White	–0.123	0.030	.0001	0.885	0.834–0.939
Rural African American	–0.140	0.095	.1440	0.869	0.720–1.050
Rural Latino	–0.356	0.088	.0001	0.700	0.588–0.834
Rural Asian/Other	–0.493	0.172	.0055	0.611	0.433–0.861
<i>Family Income</i>	0.096	0.026	.0005	1.100	1.044–1.160
<i>Family Size</i>	–0.066	0.008	.0000	0.937	0.922–0.951
<i>Number of Conditions</i>	0.477	0.024	.0000	1.610	1.537–1.688
<i>Health Condition</i>					
Well (reference group)					
Chronic	0.323	0.039	.0000	1.381	1.279–1.491
Acute	0.814	0.051	.0000	2.256	2.040–2.495
<i>Self-Assessed Health</i>					
Excellent (reference group)					
Very Good	0.232	0.023	.0000	1.261	1.206–1.319
Good	0.349	0.027	.0000	1.418	1.343–1.497
Fair	0.677	0.051	.0000	1.968	1.778–2.177
Poor	1.063	0.102	.0000	2.894	2.363–3.544
<i>Region</i>					
West (reference group)					
Northeast	0.196	0.037	.0000	1.217	1.130–1.310
Midwest	–0.010	0.036	.7895	0.990	0.921–1.065
South	–0.074	0.032	.0241	0.929	0.872–0.990

Table 3: Logistic Regression Model Predicting Physician Visit in Previous 12 Months, with Interactive Variables; NHIS 1992, Persons Under Age 65

<i>Characteristics</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>p-Value</i>	<i>Odds Ratio (OR)</i>	<i>95% C.I. for OR</i>
<i>Constant/Intercept</i>	0.960	0.086	.0000	2.611	2.202–3.096
<i>Age</i>	-0.022	0.001	.0000	0.978	0.977–0.980
<i>Education of Household Head</i>	0.070	0.005	.0000	1.072	1.062–1.082
<i>Gender</i>					
Female (reference group)					
Male	-0.654	0.018	.0000	0.520	0.502–0.539
<i>Residence and Race/Ethnicity</i>					
Urban White (reference group)					
Uninsured Urban White	-0.918	0.037	.0000	0.399	0.371–0.430
Insured Urban African American	-0.066	0.042	.1210	0.936	0.861–1.018
Uninsured Urban African American	-0.898	0.064	.0000	0.407	0.358–0.463
Insured Urban Latino	-0.097	0.044	.0288	0.908	0.832–0.990
Uninsured Urban Latino	-0.996	0.050	.0000	0.369	0.335–0.407
Insured Urban Other	-0.305	0.079	.0003	0.738	0.630–0.864
Uninsured Urban Other	-1.255	0.115	.0000	0.285	0.227–0.358
Insured Rural White	-0.145	0.033	.0000	0.865	0.810–0.923
Uninsured Rural White	-0.947	0.052	.0000	0.388	0.350–0.431
Insured Rural African American	-0.254	0.106	.0187	0.776	0.628–0.957
Uninsured Rural African American	-0.797	0.140	.0000	0.451	0.341–0.595
Insured Rural Latino	-0.387	0.109	.0007	0.679	0.546–0.844
Uninsured Rural Latino	-1.200	0.094	.0000	0.301	0.250–0.363
Insured Rural Asian/Other	-0.716	0.209	.0010	0.489	0.322–0.742
Uninsured Rural Asian/Other	-0.810	0.225	.0006	0.445	0.284–0.697
<i>Family Income</i>	0.096	0.026	.0005	1.101	1.045–1.160
<i>Family Size</i>	-0.066	0.008	.0000	0.936	0.922–0.951
<i>Number of Conditions</i>	0.476	0.024	.0000	1.610	1.536–1.687
<i>Health Condition</i>					
Well (reference group)					
Chronic	0.323	0.039	.0000	1.381	1.279–1.492
Acute	0.814	0.051	.0000	2.256	2.040–2.495
<i>Self-Assessed Health</i>					
Excellent (reference group)					
Very Good	0.232	0.023	.0000	1.261	1.205–1.319
Good	0.349	0.027	.0000	1.418	1.343–1.496
Fair	0.677	0.051	.0000	1.968	1.779–2.177
Poor	1.059	0.102	.0000	2.883	2.354–3.532

continued

Table 3: *Continued*

<i>Characteristics</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>p-Value</i>	<i>Odds Ratio (OR)</i>	<i>95% C.I. for OR</i>
<i>Region</i>					
West (reference group)					
Northeast	0.195	0.037	.0000	1.216	1.129–1.309
Midwest	–0.010	0.037	.7896	0.990	0.921–1.065
South	–0.074	0.032	.0257	0.929	0.871–0.991

least likely of the eight population groups to have used a physician during the previous 12 months. Combining insurance status and race/residence lowers considerably the odds of having seen a physician in the previous 12 months, to as low as 0.30 (i.e., 70 percent less likely) for rural uninsured Latinos. This compares with the odds for uninsurance alone being 0.422 (Table 1) and for rural Latino alone being 0.700. The overwhelming effect of insurance status is evident in creating even lower odds among urban residents, for example, 0.285 among urban Asian/others.

There are regional differences, as well, in the likelihood of seeing a physician, with residents in the Northeast being most likely and residents in the South least likely to have seen a physician. The National Health Interview Survey does not enable us to conduct an analysis that might permit us to detect within regions differences among ethnically different populations, controlling for insurance status and health conditions. When this model is applied to the Midwest region, for example, some cell sizes shrink to only 1 in the unweighted frequencies.

DISCUSSION

With the focus on utilization, the results presented here will not permit statements about the *consequences* of differences in utilization. The primary interest is in the independent effects of minority status, place of residence, and insurance status on use of healthcare services. Conclusions can be made about what affects utilization, but not about the end effects on the health of the populations examined.

A further limitation of the study is that while the sample is representative of the U.S. non-institutionalized population, the sample size is insufficient

to permit extensive subcategorization. Therefore, some questions about the different regional effects among particular subpopulations, such as chronically ill minorities, cannot be answered.

These findings do, however, lend credence to the conclusion that major forces—in this case, health insurance—that are dividing society into different groupings may be more important than more subtle divisions—in this case, eight different groups based on residence and race/ethnicity. Addressing the problems of cultural subgroups without first addressing the broader problem of health insurance would be an inadequate policy approach. Nevertheless, the differences in utilization of services based on residence and minority status are important. Access issues for rural Latinos are of special concern. In a time of changes in eligibility for public programs, and of continuing increases in migration of persons of Latino origin into rural areas to work, for example, in Midwest meat packing plants, problems of access may be accentuated. The research community should continue to probe those differences, as well as to investigate their ultimate consequences for health outcomes.

Incremental approaches to resolving problems of access are appropriately directed initially at the most important factor, insurance status. However, further incremental policies will need to address the unique problems that minority groups face, especially those groups located in rural areas. The circumstances in which rural minorities find themselves can be addressed through policies that improve their odds of having health insurance, such as economic development policies to improve employment opportunities that include adequate insurance coverage. Policies that focus on having the appropriate providers to serve those individuals should also be considered.

REFERENCES

- Aday, L. A. 1993. *At Risk in America: The Health and Health Care Needs of Vulnerable Populations in the United States*. San Francisco: Jossey-Bass.
- Aday, L., and R. Andersen. 1974. "A Framework for the Study of Access to Medical Care." *Health Services Research* (fall): 208–20.
- Aday, L. A., R. Andersen, and G. V. Fleming. 1980. *Health Care in the U.S.: Equitable for Whom?* Newbury Park, CA: Sage.
- Benson, V., and M. A. Marano. 1994. "Current Estimates from the National Health Insurance Interview Survey, 1992." *Vital Health Statistics*, vol. 10 (189). Washington, DC: National Center for Health Statistics.
- Berk, M. L., C. L. Schur, and J. C. Cantor. 1995. "Ability to Obtain Health Care: Recent Estimates from the Robert Wood Johnson Foundation National Access to Care Survey." *Health Affairs* 14 (3): 139–46.

- Braden, J. J., and K. Beauregard. 1994. *Health Status and Access to Care of Rural and Urban Populations*. National Medical Expenditure Survey Research Findings 18, Agency for Health Care Policy and Research. Rockville, MD: U.S. Public Health Service.
- Braveman, P., G. Oliva, M. G. Miller, R. Reiter, and S. Egerter. 1989. "Adverse Outcomes and Lack of Health Insurance Among Newborns in an Eight-County Area of California, 1982 to 1986." *The New England Journal of Medicine* 321 (8): 508–13.
- Braveman, P., G. Oliva, M. A. Miller, V. M. Schaaf, and R. Reiter. 1988. "Women Without Health Insurance: Links Between Access, Poverty, Ethnicity, and Health." *Western Journal of Medicine* 149 (6): 708–11.
- Clarke, L. L., C. A. Bono, M. K. Miller, and S. C. Malone. 1995. "Prenatal Care Use in Nonmetropolitan and Metropolitan America: Racial/Ethnic Differences." *Journal of Health Care for the Poor and Underserved* 6 (4): 410–33.
- Cornelius, L. J. 1991. "Access of Medical Care for Black Americans with an Episode of Illness." *Journal of the National Medical Association* 83 (7): 617–26.
- Escarce, J. J., K. R. Epstein, D. C. Colby, and J. S. Schwartz. 1993. "Racial Differences in the Elderly's Use of Medical Procedures and Diagnostic Tests." *American Journal of Public Health* 83 (July): 948–54.
- Friedman, E. 1994. "Money Isn't Everything: Nonfinancial Barriers to Access." *Journal of the American Medical Association* 271 (19): 1535–38.
- Gornick, M. E., P. W. Eggers, T. W. Reilly, R. M. Mentnech, L. K. Fitterman, L. E. Kucken, and B. C. Vladeck. 1996. "Effects of Race and Income on Mortality and Use of Services Among Medicare Beneficiaries." *The New England Journal of Medicine* 335 (11): 791–99.
- Hafner-Eaton, C. 1994. "Patterns of Hospital and Physician Utilization Among the Uninsured." *Journal of Health Care for the Poor and Underserved* 5 (4): 297–315.
- . 1993. "Physician Utilization Disparities Between the Uninsured and Insured: Comparison of the Chronically Ill, Acutely Ill, and Well Nonelderly Populations." *Journal of the American Medical Association* 269 (6): 787–92.
- Hayward, R. A., M. F. Shapiro, H. E. Freeman, and C. R. Corey. 1988. "Inequities in Health Services Among Insured Americans: Do Working-Age Adults Have Less Access to Medical Care than the Elderly?" *The New England Journal of Medicine* 318 (23): 1507–12.
- Hubbell, F. A., H. Waitzkin, and F. I. Rodriguez. 1990. "Functional Status and Financial Barriers to Medical Care Among the Poor." *Southern Medical Journal* 83 (5): 548–50.
- Lambrew, J. M., G. H. DeFries, T. S. Carey, T. C. Ricketts, and A. K. Biddle. 1996. "The Effects of Having a Regular Doctor on Access to Primary Care." *Medical Care* 34 (2): 138–51.
- Long, J. S. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, CA: Sage Publications.
- Massey, J. T., T. F. Moore, V. L. Parsons, and W. Tadros. 1989. "Design and Estimation for the National Health Interview Survey, 1985–94." *Vital Health Statistics* vol. 2 (110). Washington, DC: National Center for Health Statistics.

- Miller, M. E., J. Holahan, and W. P. Welch. 1995. "Geographic Variations in Physician Service Utilization." *Medical Care Research and Review* 52 (2): 252-78.
- Newacheck, P. W. 1989. "Improving Access to Health Services for Adolescents from Economically Disadvantaged Families." *Pediatrics* 84 (6): 1056-63.
- Shulman, N. B., B. Martinez, D. Brogan, A. A. Carr, and C. G. Miles. 1986. "Financial Cost as an Obstacle to Hypertension Therapy." *American Journal of Public Health* 76 (9): 1105-108.
- Spillman, B. C. 1992. "The Impact of Being Uninsured on Utilization of Basic Health Care Services." *Inquiry: The Journal of Health Care Organization, Provision, and Financing* 29 (4): 457-66.
- Weissman, J. S., R. Stern, S. L. Fielding, and A. M. Epstein. 1991. "Delayed Access to Health Care: Risk Factors, Reasons, and Consequences." *Annals of Internal Medicine* 114 (4): 325-31.
- Weissman, J., and A. M. Epstein. 1989. "Case Mix and Resource Utilization by Uninsured Hospital Patients in the Best Metropolitan Area." *Journal of the American Medical Association* 261 (24): 3572-76.