
DataWatch

Impact Of Socioeconomic Status On Hospital Use In New York City

by John Billings, Lisa Zeitel, Joanne Lukomnik, Timothy S. Carey, Arthur E. Blank, and Laurie Newman

Abstract: This DataWatch examines the potential impact of socioeconomic differences on rates of hospitalization, based on patterns of hospital use in New York City in 1988. The research suggests that lack of timely and effective outpatient care may lead to higher hospitalization rates in low-income areas. For certain conditions identified as ambulatory care sensitive, hospitalization rates were higher in low-income areas than they were in higher-income areas where appropriate outpatient care was more readily available. Further study is needed to determine the relative impact of various economic, structural, and cultural factors that affect access to care.

As the issues of universal coverage and health system reform become more focused in public policy discussions, it is critical that policy-makers understand how medically indigent patients currently use the health care system and how barriers to care can affect health status and resource use. This study focuses on patterns of hospital use in New York City. Large variations in rates of hospitalization have been documented in studies comparing rates among nations, regions, states, communities, and neighborhoods.¹ While a broad range of explanations has been offered, most research has centered on the impact of differences in physician decision making that result from the uncertainties inherent in medical practice and the lack of definitive scientific evidence for many clinical decisions.²

In our research we examine an area that has been less thoroughly explored: the potential impact of differences in socioeconomic status on hospitalization rates.³ Our goals were to improve our understanding of the causes of any variation in hospital use that is associated with income levels of area residents and to determine whether small-area analysis might become a useful tool for assessing barriers to outpatient care and for evaluating the effectiveness of programs designed to improve access to care.

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Methodology

The hospital data in this study were for 1988 and were based on computerized discharge abstracts provided by the New York Statewide Planning and Research Cooperative System (SPARCS). Demographic data used in the study were obtained from Donnelley Marketing; data include population estimates by age and sex for each ZIP code in 1988 that were projected from 1980 census data and adjusted to reflect current ZIP code boundaries.

Hospital utilization rates were calculated at the ZIP code level for 164 residential ZIP codes in New York City. Ten ZIP codes with an estimated population of fewer than 6,000 residents were combined with adjacent ZIP codes with similar socioeconomic characteristics. Our analysis focused primarily on persons under age sixty-five because any impact of indigence or barriers to access was hypothesized to be greatest among this predominantly non-Medicare population. Rates were age- and sex-adjusted using standard statistical techniques (direct method).

In our analysis of the impact of income on utilization rates, ZIP codes were evaluated based on the percentage of households in the ZIP code with incomes below \$15,000. For the purposes of comparing low-income and high-income areas, low-income ZIP codes were defined as areas with more than 60 percent of households with incomes below \$15,000, and high-income ZIP codes were defined as areas with less than 17.5 percent of households with incomes below \$15,000.⁴

Diagnoses used in the analysis were specified at the *International Classification of Diseases, Ninth Revision* (ICD-9-CM) level. A medical advisory panel of six internists and pediatricians, including national and local experts on the provision of care to the medically indigent and the problems associated with access barriers, was formed to develop a diagnostic framework for analyzing hospital use patterns. Using a modified Delphi approach, the panel defined three basic categories for grouping causes of hospital admission: (1) marker conditions-diagnoses for which the provision of timely and effective outpatient care is likely to have little impact on the need for hospital admission and where there is substantial agreement among practitioners on the clinical criteria for admission; (2) ambulatory care sensitive (ACS) conditions-diagnoses for which timely and effective outpatient care can help to reduce the risks of hospitalization by either preventing the onset of an illness or condition, controlling an acute episodic illness or condition, or managing a chronic disease or condition; and (3) referral-sensitive surgeries-high-cost/high-technology surgical procedures for which impediments to access or referral to specialty care may reduce the chances of having the surgery.⁵ To evaluate severity of illness, we used automated disease staging and TOTSCALE, computerized systems

developed by SysTeMetrics for use with discharge abstract data; this is described in detail elsewhere.⁶ Although all severity classification systems have limitations and interpretation of results requires caution, the SysTeMetrics automated system has been used by researchers to assess severity for large databases for which manual record review is impractical.⁷

Results

Hospital use rates. For some conditions, there is relatively little disagreement among physicians about the criteria for hospital admission. For a subset of these conditions, lack of ambulatory care during the period immediately prior to admission is likely to have little effect on the need for admission. As anticipated, relatively low levels of variation were documented for the population under age sixty-five for these "marker conditions," and no significant differences in hospital use rates between low- and high-income areas were observed. For example, for myocardial infarction (including only cases with a disposition of death or length-of-stay greater than five days), no association ($R^2 = .001$) was found between ZIP code admission rates and percentage of households in the ZIP code with incomes below \$15,000, and the ratio between the admission rate for all low-income ZIP codes combined and all high-income ZIP codes combined was 1.00.

The low level of variation for these marker conditions and the comparability of hospital utilization rates among low- and high-income ZIP codes may help to dispel at least some of the uncertainties inherent in using population projections based on census data. Systematic undercounting or underestimation of populations in low-income areas, for example, would have produced higher-than-average admission rates for marker conditions in these ZIP codes. However, although some differences were observed for a few ZIP codes, no pattern of variation associated with income was found for marker conditions, indicating that any deficiencies in population estimates were unlikely to have a large impact on our findings.

For conditions identified by the panel as being potentially responsive to timely and effective outpatient management, the population under age sixty-five in low-income areas had substantially higher admission rates than in high-income areas, with a strong association found between area admission rates and the percentage of area population with household incomes below \$15,000. For example, admission rates for asthma were 6.4 times higher in low-income areas than in high-income areas, with more than 70 percent of the variation among areas explained by household income. Similarly, admission rates for diabetic ketoacidosis and hyperosmolar coma were 6.3 times higher in low-income areas; bacterial pneumonia, 5.3 times higher; and congestive heart failure, 4.6 times higher, with 50-60 percent

of the variation explained. by area income. For all ACS conditions combined, low-income areas had rates four times higher, with almost 70 percent of the variation explained by area income (Exhibit 1).

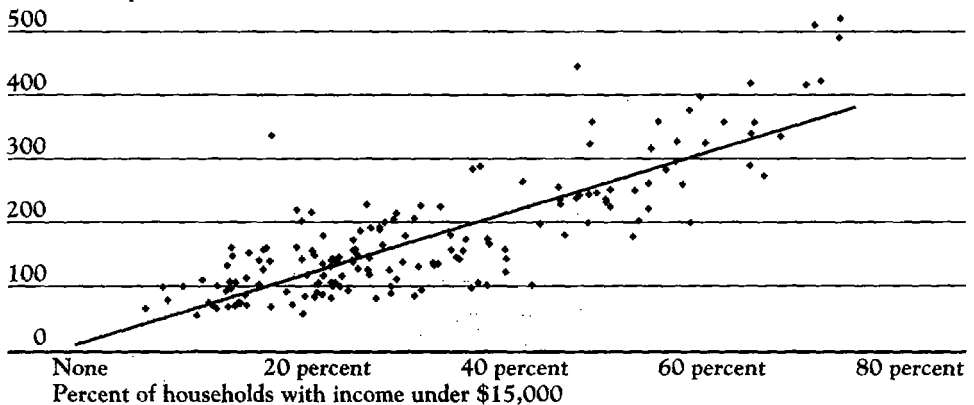
For several common surgical procedures, such as cholecystectomies or transurethral prostatectomies, virtually no association was found for nonelderly patients between ZIP code income and admission rates; in fact, low-income areas actually had slightly higher rates. This finding may relate to the strong presence of teaching hospitals in the area, where the need for patients for resident training may help obviate any barriers to surgical care. However, for higher-cost, more technology-intensive, referral-sensitive surgeries (such as organ transplants, coronary bypass surgery, joint replacement, and so forth), low-income areas were found to have rates about half those of higher-income areas for the population under age sixty-five, with a negative association ($R^2 = .239$) between percentage of households with incomes less than \$15,000 and admission rates.

Comparison among age groups. One of the most interesting results from the New York City small-area analysis was the difference in the extent of variation and the degree of association with ZIP code income that was observed among age groups. Differences in utilization patterns between low- and high-income areas peaked in the age twenty-five to forty-four cohorts, with substantially smaller differences in rates and weaker correlations among the youngest and oldest age cohorts (Exhibit 2). This peak was especially pronounced for acute ACS conditions (bacterial pneumonia,

Exhibit 1

Admission Rates For Conditions That Are Responsive To Outpatient Treatment, By Area Income, Persons Under Age Sixty-Five, New York City, 1988

Admissions per 10,000 residents



Source: New York Statewide Planning and Research Cooperative System (SPARCS); and United Hospital Fund.

Note: $R^2 = .691$.

Exhibit 2
Ambulatory Care Sensitive (ACS) Admissions, Comparisons Among Age Cohorts, New York City, 1988

Age	Average admissions per 10,000	Coefficient of variation	Ratio of low income to high income	Association with area income (R2)
0-5	398.4	0.483	3.28	.453
6-17	92.1	0.494	3.01	.544
18-24	119.1	0.528	3.74	.559
25-34	145.6	0.636	4.85	.645
35-44	145.0	0.755	6.19	.640
45-54	207.3	0.580	4.29	.1648
55-64	300.7	0.444	3.03	.569
65-74	447.6	0.343	2.18	.351
75 and older	937.9	0.319	1.28	.037

Source: New York Statewide Planning and Research Cooperative System (SPARCS); and United Hospital Fund.

cellulitis, and kidney/urinary infections), while differences in rates between low- and high-income areas among the elderly tended to persist for chronic ACS conditions (asthma, diabetes, and hypertension.).

Effect of race. While area income was generally the most powerful predictor of area hospital use rates for ACS conditions, race also had some influence on rates. Predominantly black middle-class ZIP codes generally had ACS condition rates comparable to other middle-class areas, but poor black areas had admission rates that were consistently higher than in other low-income ZIP codes. However, for one condition, hypertension, where substantial differences in disease prevalence/incidence among black populations have been documented, race was a more powerful predictor of hospitalization rates than was area income.

Other variables. Some of the differences in ACS admission rates observed between low- and high-income areas could be attributable to many factors unrelated to the provision of timely outpatient care. We explored the potential impact of three important variables: disease prevalence/incidence, patient lifestyle (alcohol/substance abuse), and possible differences in physician decision making,

Disease prevalence/incidence. To the extent that low-income populations tend to have higher rates of disease prevalence/incidence, correspondingly higher hospital admission rates might be expected. The availability of reliable information on disease prevalence/incidence among income subgroups is somewhat limited. For the purposes of this analysis, we examined data on reported chronic disease from the National Health Interview Survey for two high-volume ACS conditions, asthma and diabetes. Some differences in prevalence among income groups for these conditions were

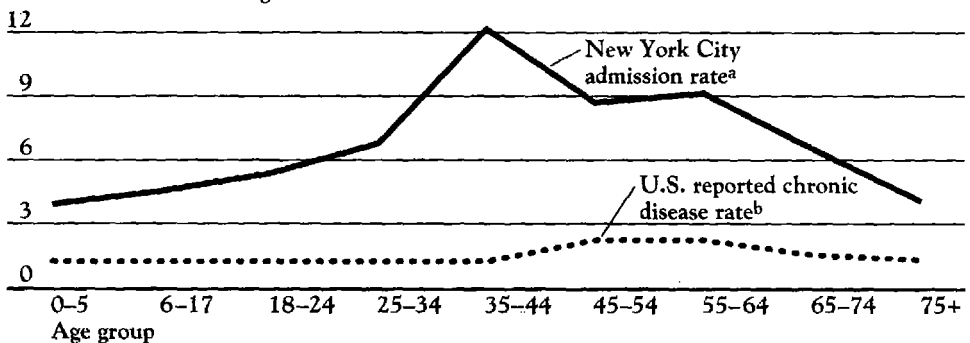
documented, with U.S. low-income populations in 1987-1989 having prevalence rates 1.35 to 2.36 times higher among age cohorts for asthma and 1.15 to 2.96 times higher for diabetes.⁸ However, differences in New York City hospital utilization rates in 1988 were substantially larger, with low-income areas having admission rates as much as 13.88 times higher for asthma and 11.90 times higher for diabetes for some age groups. A comparison of the ratio between low- and high-income areas for both prevalence of and hospital discharges for asthma is displayed in Exhibit 3. Accordingly, while differences in disease prevalence/incidence are important, it appears that they account for only a small portion of the differences in hospitalization rates among low- and high-income areas.

Lifestyle factors. Patients with serious alcohol and substance abuse problems (and the concomitant social dysfunction) may be at greater risk for some acute conditions (such as pneumonia and cellulitis) or may experience greater difficulties in managing chronic conditions (such as diabetes and tuberculosis). We identified all ACS patients for whom alcohol or drug dependence/abuse was listed as a secondary diagnosis. Overall, 11.6 percent of ACS admissions had alcohol or drug dependence/abuse listed, with the level among low-income areas 18.2 percent and among high-income areas 4.3 percent. However, the percentage of all patients with an alcohol/drug related secondary diagnosis differed widely among ACS conditions, with much higher levels for some diagnoses (such as pneumonia [28.1 percent], cellulitis [28.5 percent], and tuberculosis [41.8 percent]) and much lower percentages for others (such as asthma [3.8 percent], gastroenteritis [3.1

Exhibit 3

Incidence Of Asthma, Ratio Between High- And Low-Income Groups, New York City Hospital Admission Rate And U.S. Reported Chronic Disease Rate

Ratio of low income to high income



Sources: New York Statewide Planning and Research Cooperative System (SPARCS); National Center for Health Statistics, National Health Interview Survey, 1987-1989; and United Hospital Fund.

^a 1988.

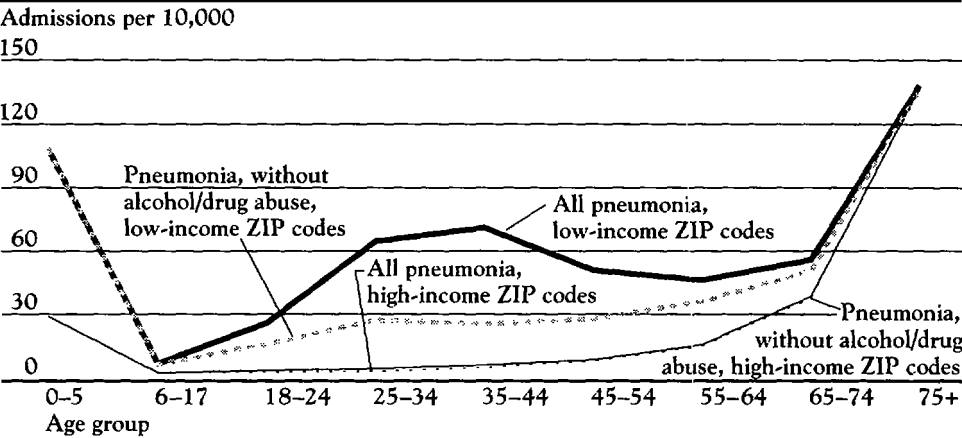
^b 1987-1989.

percent], and severe ear, nose, and throat infections [2.8 percent]). Accordingly, while alcohol/substance abuse may help to explain the peak in the ratio of rates between low- and high-income areas for the population ages twenty-four to forty-four for some acute conditions (see Exhibit 4), differences remain between low- and high-income areas for nonelderly populations even after accounting for the impact of this lifestyle variable.

Physician decision making. Another factor that may contribute to higher admission rates among low-income areas is a possible difference in admission criteria among physicians serving these low-income patients. To the extent that physicians providing care to such patients have a lower threshold for admission and tend to admit less severely ill patients, higher admission rates would be anticipated for such neighborhoods. These differences in physician decision making might relate to factors such as differences in clinical training and attitudes toward risk, but might also involve the need to incorporate access-related considerations in the admission decision process for indigent patients, including concerns about linkage to outpatient care, the adequacy of family/social support, or the ability or willingness of the patient to comply with an outpatient treatment regimen.

To evaluate this hypothesis, we compared severity of ACS patients in low- and high-income areas using TOTSCALE and automated disease staging. While substantial variation among ZIP codes in relative severity levels was observed, no consistent pattern of a higher level of severity

Exhibit 4
Effect Of Alcohol And Drug Use/Dependence On Pneumonia Admissions, By Age Group And Area Income, New York City, 1988



Sources: New York Statewide Planning and Research Cooperative System (SPARCS); and United Hospital Fund
Note: The lower two graph lines, portraying all pneumonia and pneumonia without alcohol/drug abuse in high-income ZIP codes, have virtually the same values and are nearly indistinguishable.

among patients from high-income ZIP codes was documented. For many diagnostic categories, low-income areas had higher levels of severity, suggesting a stricter threshold for admission for low-income patients.⁹

Policy Implications Of Small-Area Analysis

In this study we found a consistently strong association between hospital admission rates and area income for a broad range of conditions that are sensitive to the provision of timely and effective outpatient care. Even after adjustment for many variables, large and pervasive differences remained between low- and high-income areas. Definitive conclusions about the specific causes of these differences associated with income must await prospective or case-control studies that compare the outpatient care provided to patients from low- and high-income areas before admission. However, our findings suggest that access to ambulatory care and the performance of the outpatient care delivery system may have a substantial effect on admission rates for a broad range of medical and surgical conditions.

This hypothesis is reinforced when the pattern of variation among different age cohorts is examined. The largest differences between low- and high-income populations were observed in the young adult and middle-aged populations (Exhibit 2). These are the groups most likely to be affected by access problems, given higher rates of uninsurance and less experience in navigating the complexities of our fragmented health care delivery system. The differences associated with income were smaller for children age five and under, a population for whom Medicaid eligibility is focused and for whom outpatient resources are often specifically targeted. The association with income and amount of variation among areas were also dramatically lower among the elderly. While Medicare coverage does have some gaps, it pays for a significant amount of outpatient medical care and provides reimbursement levels that historically have been high enough to encourage participation of most physicians. Moreover, elderly patients are likely to be frequent users of care, and some of the intangible barriers to care associated with using a complex health care delivery system are likely to be somewhat mediated by age and experience.

A valuable community tool. To the extent that these differences in rates are attributable to access barriers, small-area analysis may prove to be a valuable planning and evaluation tool. First, the technique may be helpful in making comparisons among communities. Policymakers interested in assessing the impact of local access barriers often look for a yardstick to evaluate where their community stands compared with others in meeting the needs of the medically indigent. Examining hospital admission rates for ACS conditions may be a useful tool for monitoring need,

providing valuable information for establishing local health priorities, or allocating limited resources among communities.

Second, with constrained resources, it is increasingly important to target interventions as effectively as possible. Small-area analysis may help a community to identify neighborhoods with the greatest need. For example, we observed two ZIP codes with admission rates for .ACS conditions two to three times higher than in other ZIP codes with comparable demographic profiles. Further analysis revealed that the differences were greatest (six times higher) among children age five and under. These Manhattan ZIP codes happen to have been the areas where the city's most notorious welfare hotels were then concentrated, indicating a failure to match resources with needs in these neighborhoods. Careful analysis of patterns may also help planners to define the type of intervention for the most impact.

Third, small-area analysis may have some use in evaluating interventions. One of the weakest links in many efforts to provide care for the indigent (and a factor that often generates resistance among otherwise sympathetic elected officials) is the absence of any mechanism to evaluate the effectiveness of programs intended to improve access. Analysis of hospital use rates before and after implementation may provide a means to assess the impact of both major initiatives (such as changes in Medicaid coverage or provider reimbursement levels, or the expansion of direct service programs) and more targeted efforts (such as a single hospital's or community health center's outreach program for asthma management or prenatal care within its service area).

Need for more research. While these potential applications are promising, it is also important to recognize what is not known. Our efforts to account for the impact of disease prevalence/incidence were hindered by the limited availability of strong scientific evidence. Better information is needed on the nature and causes of prevalence differences among subgroups and how these differences show in consumption of health care resources.

We made no attempt to account for the potential impact of environmental factors on admission rates. The broad range of conditions examined and the consistent pattern of higher rates among low-income areas suggest that no single environmental factor is likely to account for the large differences in hospitalization observed among income groups. However, the potential for deficiencies in housing, inadequate sanitation, and exposure to other environmental risks to affect admission rates for some conditions no doubt is large and needs to be explored further.

In the current analysis we were unable to account for readmissions. To the extent that higher admission rates for ACS conditions among low-income areas were attributable to repeat admissions by a small number of individuals (rather than single admissions of a larger number of patients),

the character of the access problem revealed by our data may be somewhat different. While our underlying hypothesis about the importance of access would apply in either case, clearly the interventions suggested by the alternative explanations would be quite different. If relatively few chronically ill or high-risk patients were found to be driving the high rates for an area, a program targeted at providing services, care management, and social assistance to these individuals is likely to have a substantial impact. Conversely, if a larger number of patients with single episodes of illness were responsible for higher rates in an area, more broadly based initiatives undoubtedly would be required.

Access barriers. Finally, we have discussed access as if it were a one-dimensional, well-defined problem. Clearly it is not. Much remains unknown about the nature and causes of impediments to access. It is vitally important to understand more about the various economic, structural, and personal barriers that are traditionally lumped together as “access barriers.”

For example, much of the national debate about access has focused on providing coverage for Americans who are uninsured. Removing this direct economic barrier to care is obviously an important step in improving access to care. But the vast majority of hospitalized patients from low-income areas in our study had Medicaid coverage, providing dramatic evidence of the reality that an insurance card alone may not be sufficient. Low Medicaid reimbursement for outpatient care in many states severely limits the availability of providers willing to accept Medicaid patients, and a Medicaid cardholder’s “access” to care is often reduced to a choice among an overcrowded clinic, a storefront “Medicaid mill,” or a busy hospital emergency room. Moreover, indirect economic barriers to care also can prove insurmountable for many indigent patients—getting off work, forgoing wages, arranging child care, and procuring transportation. How these factors influence outpatient use and hospital admission rates is not well documented, and our analysis could not distinguish among these factors.

How the organization and mix of available outpatient resources affect access is also unclear. The presence or absence of a public hospital, how well community-based clinics are integrated with inpatient providers, and the effectiveness of community outreach programs all may influence the accessibility of ambulatory care in an area. In our analysis we observed that some low-income neighborhoods had admission rates that were significantly higher than in other areas with a similar socioeconomic mix. These differences may indicate the need for more resources in these areas or may be a “red flag” indicating performance problems in existing programs. Small-area analysis alone cannot provide answers to these questions.

A broad range of personal factors also can influence access: language barriers, educational deficits, differences in health beliefs, and the presence

or absence of a strong, stable home environment. The ability of an outpatient delivery system to identify and respond to these needs may well have a large impact on utilization patterns, especially in the nation's "third-world" inner-city areas. Patients who resist use of a local clinic because the provider does not speak their language or is not sensitive to their customs are clearly at increased risk of delaying care and are more likely to use the hospital emergency room as an entry point to the system. For many chronic diseases such as asthma or diabetes, patient education on outpatient management of the condition is essential to assure compliance and to maintain effective control of the condition. To the extent that a community-based provider is unable to provide patient education in a manner that accommodates the unique needs or special circumstances of medically indigent patients, patient compliance is likely to be impaired, and the risks of acute flare-ups requiring hospitalization are increased. The relative importance of these factors compared with the other components of access cannot be assessed from our research and needs to be explored further.

In conclusion. Our research suggests that a lack of timely and effective ambulatory care may have a significant impact on hospitalization rates in low-income areas. Barriers to access have a serious deleterious effect on the health status of the medically indigent and create substantial inefficiencies in the health care delivery system. As policymakers debate universal coverage, it is critical to recognize the importance of assuring the establishment and maintenance of an effective outpatient delivery system. While there are likely to be substantial costs associated with improving outpatient access for the indigent and uninsured, there may also be some potential cost saving on the inpatient side where timely outpatient care prevents the need for hospital admission. However, barriers to access remain something of a "black box," and further research is required to identify the relative impact of the economic, structural, and cultural factors that affect access for the medically indigent and to understand better the provision of timely ambulatory care and its effect on hospital admission rates.

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NOTES

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