Recent Findings On Preventable Hospitalizations

Insurance coverage is important, but it does not always assure access to health care. A comparison of Canadian and U.S. cities shows that persons in low-income areas are more likely to put off getting care until it is too late to avoid hospitalization.

by John Billings, Geoffrey M. Anderson, and Laurie S. Newman

ABSTRACT: Disparities in health outcomes for low-income populations as documented by rates of preventable hospital admissions remain large in the United States, even with the moderate expansion of Medicaid and efforts at the state and local levels to improve primary care services that began in the mid-1980s. These differences in outcome for rich and poor are not an isolated phenomenon of a few old and decaying Northeast urban centers but are documented in a broad range of urban areas. Much smaller differences are found in urban areas in Ontario, where universal coverage may help to reduce barriers to care.

RATES OF PREVENTABLE hospitalization often are used to document potential barriers to ambulatory care, to assess the performance of the primary care delivery system, and to identify possible deficiencies in the quality of outpatient care.' Delay in receiving or failure to obtain timely, effective ambulatory care can result in avoidable hospital admissions for many common conditions such as asthma, diabetes, congestive heart failure, and cellulitis. Higher rates of admission for these conditions in an area or among a population subgroup can be an indication of serious access or performance problems.

With the demise of national health care reform in the United States, impending Medicare and Medicaid cutbacks, and the traumatic alteration of the health system ecology resulting from the growth of managed care (especially among Medicaid populations), it is important to understand and interpret rates of preventable

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hospital admissions and any changes over time. To date, studies of preventable hospitalizations have been limited to a handful of major U.S. cities. If rates of preventable hospitalization can in fact be used in measuring barriers co primary care, then it is critical that the method prove feasible in a diverse range of metropolitan areas, that rates be relatively stable over time, and that findings and changes in rates reflect differences in primary care policies in these areas.

In this study we look at the relationship between income and rates of preventable hospitalizations in eighteen urban areas in North America and examine how the relationship is shaped by policies and resources in those regions. In particular, we examine the extent to which the lack of financial barriers to care in the Canadian health care system means that the relationship between income and discharge rates for preventable hospitalizations is different in Ontario than in a broad cross-section of U.S. cities. Similarly, we examine the changes in discharge rates for preventable conditions in New York City over an eleven-year period and discuss their relationship to changes in the city's health care delivery system.

Data and methods. Hospital discharge data for U.S. urban areas were obtained from uniform discharge data sets provided by state agencies. Data on hospitalizations in Ontario were obtained from the Canadian Institute for Health Information (CIHI), which collects data on each discharge from an acute care institution in Ontario. ZIP code-level U.S. population counts and demographic data were obtained from Claritas/NPDC and are based on the 1980 and 1990 censuses. Population estimates for the years between census counts were interpolated by using the average annual growth rate between 1980 and 1990. Population estimates for 1992 were provided by Claritas/NPDC, and estimates for 1991 were interpolated based on the growth rate between 1990 and 1992. Ontario demographic data were obtained from the 1991 Canadian census, and population counts for 1990 were interpolated from 1986 and 1991 census data.

U.S. urban areas were defined at the county or ZIP code level using boundaries for metropolitan statistical areas (MSAs) as specified by the U.S. Department of Commerce. The Ontario areas were defined on the basis of Census Metropolitan Areas (CMAs), as defined by Statistics Canada, and used the first three characters of Canada's postal code, which define a forward sorting area (FSA) (Exhibit 1).

Hospital discharge rates were calculated for persons under age sixty-five at the ZIP code and FSA levels and were adjusted for age and sex using the direct method (standardized to the 1980 U.S. census). Areas with populations of fewer than 6,000 persons were

EXHIBIT 1

Demographic Characteristics Of The Study Areas, Persons Under Age Sixty-Five, 1990

Metropolitan area	Number of ZIP/FSA codes	Average population under age 65	Percent of households with Income < $15,000[a]	Coefficient of variation, ZIP/FSA Income	Percent black
	All ZIP/FSA areas				
Boston	148	18,659	17.7%	0.528	6.3%
Buffalo	44	18,651	27.1	0.538	11.1
Jersey City/Bergen/Passaic	87	18,147	17.7	0.540	9.0
Los Angeles	250	30,973	20.3	0.555	10.5
Miami	65	25,545	28.9	0.506	19.1
New York City	236	31,492	25.8	0.664	23.3
Newark	93	17,400	16.4	0.824	22.0
Oakland	73	25,357	16.3	0.716	14.2
Orlando	39	24,179	19.1	0.443	12.1
Portland (OR)	59	18,513	20.9	0.468	3.0
Rochester (NY)	53	15,020	20.0	0.545	9.9
San Diego	69	28,845	17.8	0.569	6.0
San Francisco	57	24,420	16.2	0.617	7.3
Seattle	76	23,032	16.1	0.450.	4.0
Tampa/St. Petersburg	96	16,889	26.2	0.396	8.8
Hamilton	29	16,460	19.0	0.620	1.1
Ottawa	32	17,128	15.3	0.653	1.8
Toronto	153	21,187	15.6	0.516	4.3
	Excluding lowest-income ZIP/FSA areas[b]				
Boston	147	18,628	17.5	0.515	5.8%
Buffalo	36	18,810	21.5	0.367	5.7
Jersey City/Bergen/Passaic	86	17,976	17.3	0.517	8.6
Los Angeles	233	30,818	19.4	0.448	9.0
Miami	51	25,123	22.0	0.342	14.4
New York City	202	29,475	21.2	0.483	18.5
Newark	89	17,306	14.9	0.659	19.1
Oakland	69	25,817	15.0	0.625	12.9
Orlando	37	24,667	18.1	0.328	10.4
Portland (OR)	57	18,983	20.4	0.375	3.0
Rochester (NY)	50	14,709	17.8	0.421	6.7
San Diego	67	28,246	17.1	0.485	5.4
San Francisco	56	24,639	15.5	0.564	7.0
Seattle	76	23,032	15.6	0.450	3.9
Tampa/St. Petersburg	90	16,970	24.9	0.324	6.7
Hamilton	27	16,921	17.9	0.620	1.0
Ottawa	32	17,128	15.3	0.653	1.8
Toronto	153	21,789	15.6	0.469	4.3

SOURCE: New York University Health Research Program.

NOTE: FSA is forward sorting area, the Canadian equivalent of a ZIP code.

[a] $20,000 in Canadian dollars.

[b] More than 40 percent of households with income below $15,000 ($20,000 Canadian).

joined with contiguous areas with similar sociodemographic characteristics. Diagnoses were specified for U.S. urban areas using a modified classification scheme for ambulatory care-sensitive (ACS) conditions based on the *International Classification* of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) for U.S. urban areas.[2] For Ontario, CIHI hospital discharge data contain diagnostic information using ICD-9 codes, which lack the fifth digit found for some ICD-9-CM codes. Where the fifth digit was required to narrow diagnostic groupings for ACS classification (such as for hypertension or congestive heart failure), those conditions were dropped from the analysis.

To compute association with income, the independent variable is the percentage of households with incomes below $15,000 ($20,000 Canadian); the dependent variable is the age/sex-adjusted rates of admission for ACS conditions for the population under age sixty-five, weighting admission rates by proportion of population under age sixty-five in a ZIP code or FSA area. The ratio of low income to high income is based on a calculation of the expected rate from the regression coefficient for areas with 40 percent of households with incomes below $15,000 ($20,000 Canadian) and with 10 percent of households with incomes below $15,000 ($20,000 Canadian).

Study Results

Major urban areas: United States and Ontario. Although ACS admission rates differed significantly among the U.S. urban areas studied (Portland, Oregon, had 6.85 admissions per thousand population, whereas New York City had 15.16 per thousand), large differences between low- and high-income areas remained regardless of citywide rates or geographic area (Exhibit 2). Average admission rates in low-income areas were as much as 3.7 times greater than rates in higher-income areas, with individual low-income ZIP code areas having rates more than twenty times higher than those in some of the more affluent ZIP code areas (Exhibit 2).

As in previous studies, we observed a strong association in U.S. urban areas between the percentage of low-income residents and the admission rate for ACS conditions for nonelderly patients (Exhibits 2 and 3). The association was strongest in Buffalo and Newark, with more than 80 percent of the variation among ZIP codes explained by a single variable: percentage of low-income persons.

The Miami area had somewhat lower levels of association with income and smaller differences in rates among low- and high-income areas (rates were only 58 percent higher in low-income neighborhoods). This was particularly evident among Cuban American ZIP code areas (Exhibit 4), where admission rates were

EXHIBIT 2

Ambulatory Care-Sensitive (ACS) Admissions Per 1,000 Persons Under Age Sixty-Five, 1990

	All ZIP/FSA areas			Excluding lowest-income ZIP/FSA areas[a]		
Metropolitan area	ACS admissions per 1,000	Association with Income (R^2)	Ratio of low Income to high Income	ACS admissions per 1,000	Association with Income (R^2)	Ratio of low Income to high Income (R^2)
Boston	11.84	0.581	2.58	11.64	0.548	2.38
Buffalo	8.90	0.840	2.92	7.40	0.595	2.44
Jersey City/ Bergen/Passaic	13.20	0.675	3.21	12.76	0.619	3.00
Los Angeles	10.34	0.518	2.09	9.69	0.388	1.98
Miami	10.90	0.371	1.58	9.85	0.229	1.59
New York City	15.16	0.663	3.13	12.14	0.331	2.08
Newark	14.48	0.827	3.51	13.18	0.801	3.59
Oakland	8.90	0.674	2.55	8.55	0.644	2.51
Orlando	10.29	0.557	2.36	10.01	0.452	2.52
Portland (OR)	6.85	0.586	2.59	6.75	0.504	2.40
Rochester (NY)	8.21	0.734	2.95	7.47	0.579	3.02
San Diego	7.15	0.756	2.64	6.90	0.708	2.49
San Francisco	8.55	0.633	3.70	8.26	0.542	3.50
Seattle	6.92	0.606	2.32	6.78	0.494	2.04
Tampa/ St. Petersburg	9.63	0.513	2.05	9.28	0.374	1.92
Hamilton	7.25	0.409	1.58	7.08	0.319	1.52
Ottawa	7.43	0.672	1.79	7.43	0.672	1.79
Toronto	7.38	0.103	1.39	7.35	0.080	1.36

SOURCE: New York University Health Research Program.

NOTE: FSA is forward sorting area, the Canadian equivalent of a ZIP code.

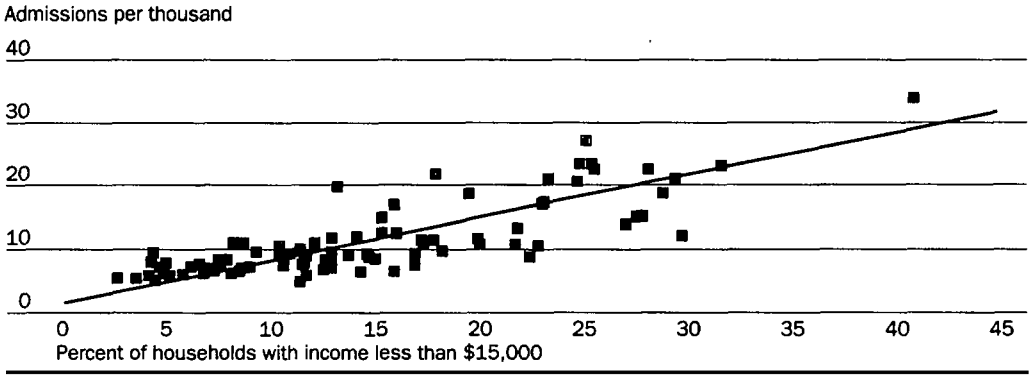
[a] More than 40 percent of households with income below $15,000 ($20,000 Canadian).

virtually identical, regardless of area income. In non-Latino ZIP code areas the association was comparable to that in other U.S. metropolitan areas.

The notable exception to these findings was utilization rates for Toronto (Exhibit 5). Although the overall rate for Toronto (7.38 per thousand) was comparable to that for many U.S. urban areas (especially its nearest neighbors, Buffalo and Rochester), there was little association between area rates and the percentage of low-income residents and only somewhat higher rates among low-income areas (39 percent higher). Although low-income residents are dispersed more evenly throughout the Toronto area, the contrast with U.S. urban areas remains remarkable, even when ZIP code areas with very high levels of poverty (more than 40 percent of households with incomes of less than $15,000) are excluded from the analysis for

EXHIBIT 3

Ambulatory Care-Sensitive (ACS) Admissions In The Jersey City/Bergen/Passaic Metropolitan Statistical Area, Persons Under Age Sixty-Five, 1990



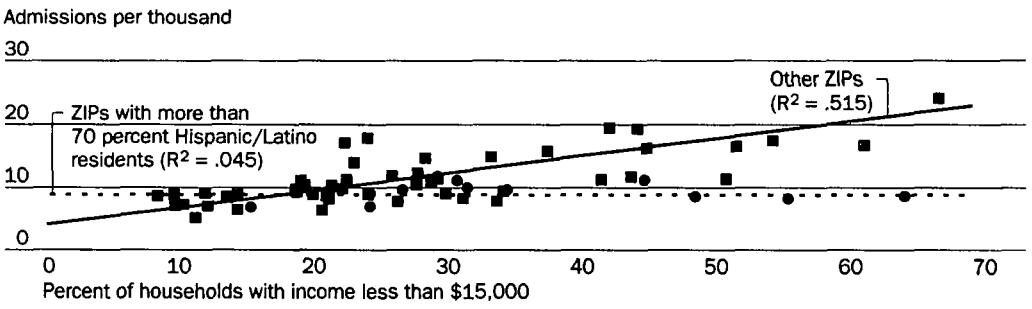
SOURCE: New Jersey Department of Health.

U.S. cities (Exhibits 1 and 2).[3] This lack of association with income also was found for individual ACS conditions in Toronto, even for chronic conditions such as asthma and diabetes that typically have much higher admission rates in low-income areas in U.S. urban centers. Two smaller urban areas in Ontario, Ottawa and Hamilton, also had smaller differences in rates among low- and high-income areas, but the association with income was stronger and more comparable to the US. urban areas studied.

Trends in ACS rates: New York City, 1982-1993. While population-based admission rates for all causes declined 11.5 percent between 1982 and 1993, rates for preventable hospital admissions increased 28.3 percent during this period. Relative rates for individual ZIP code areas were remarkably stable, with high-rate ZIP code

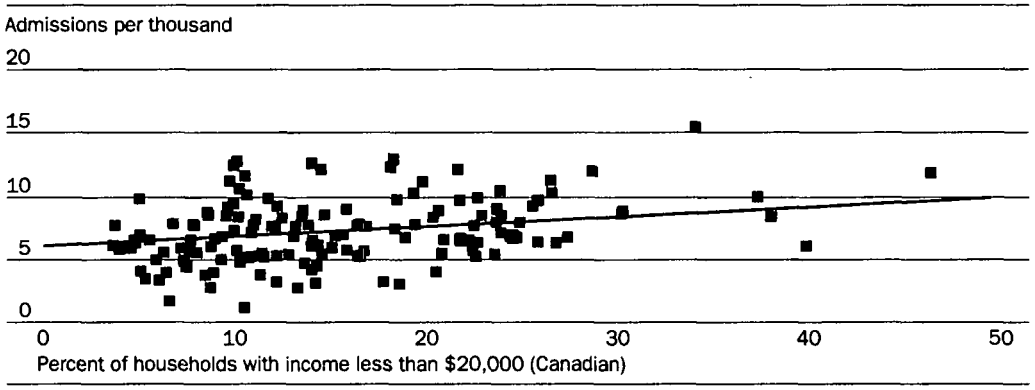
EXHIBIT 4

Ambulatory Care-Sensitive (ACS) Admissions In The Miami Metropolitan Statistical Area, Persons Under Age Sixty-Five, 1990



SOURCE: Florida Agency for Health Care Administration.

EXHIBIT 5
Ambulatory Care-Sensitive (ACS) Admissions In The Toronto Metropolitan Statistical Area, Persons Under Age Sixty-Five, 1990



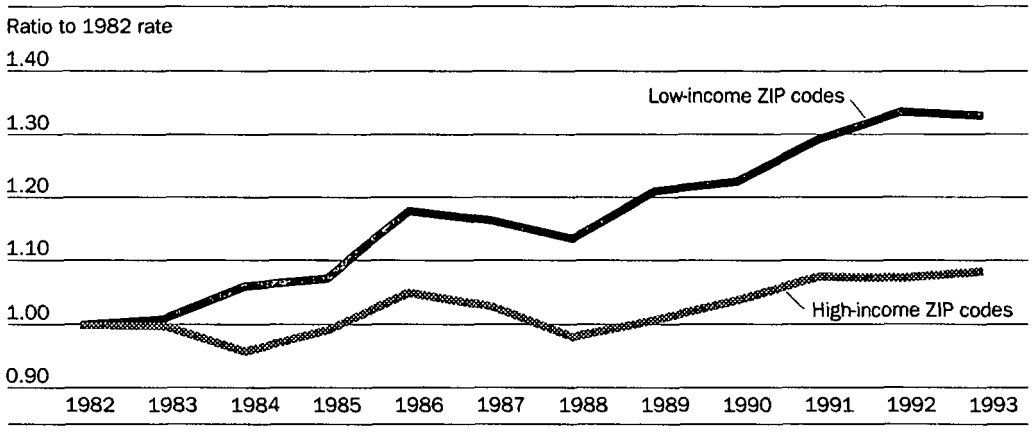
SOURCE: Canadian Institute for Health Information.
NOTE R^2 = .103

areas remaining relatively high and low-rate ZIP code areas remaining low (with 85 percent of the variation in 1993 rates explained by the 1982 rate). However, the rate of increase differed significantly by area, with low-income ZIP code areas increasing more (33.1 percent) than higher-income areas (8.4 percent) (Exhibit 6). Some low-income areas had even larger increases: ACS rates rose 62.3 percent in Bushwick and 59.1 percent in Central Harlem, although rates in the South Bronx increased only 22.1 percent. Overall, low-income areas had ACS rates that were 2.8 times higher than those in high-income neighborhoods in 1982; by 1993 this disparity had increased, so that ACS rates in low-income areas were 3.4 times higher than those in high-income areas.

Rates for almost all individual ACS conditions went up during the study period. The largest increases occurred for chronic conditions, such as asthma (45.0 percent), diabetes (46.1 percent), and congestive heart failure (65.8 percent). Increases were significantly higher for low-income areas than for high-income areas for most of these individual conditions, except for asthma, for which substantial increases were experienced in both low- (48.3 percent) and high-income areas (50.4 percent).

Rates of hospitalization for asthma also differed from those for other ACS conditions, in that increases in admission rates were larger among children (67.5 percent) than among adults (23.8 percent); rates for children in high-income areas increased at about the same rate as those for children in low-income areas. For other ACS conditions, admission rates for children from low-income areas actually declined 11.7 percent during the study period, while rates for

EXHIBIT 6
Change In Ambulatory Care-Sensitive (ACS) Admission Rate In New York City, By Area Income, Persons Under Age Sixty-Five, 1982-1993



SOURCE: New York Statewide Planning and Research Cooperative System (SPARCS).
NOTE: 1.00 represents no change.

adults from low-income areas increased 45.6 percent (compared with 8.0 percent for adults from high-income ZIP code areas).

Discussion And Policy Implications

U.S./Canada comparisons. Disparities in health outcomes for low-income populations as documented by rates of preventable hospital admissions remain large in the United States, even with the moderate expansion of Medicaid and state and local efforts to improve primary care services that began in the mid-1980s. These disparities are not an isolated phenomenon of a few old and decaying Northeast urban centers but are documented in virtually every U.S. urban community that we studied. Even rapidly growing communities such as Portland, Seattle, and San Diego, with relatively low levels of poverty and/or small minority populations, experienced similar results.

The pattern is different in Ontario. Although low-income areas in Ontario have experienced higher rates of admission, the differences between high- and low-income areas are not as dramatic as those found in U.S. cities. The contrast between Toronto, Canada's largest metropolitan area, and the major U.S. cities studied is startling. In a system with universal health care coverage and no incentives for providers to limit services to the poor, the relationship between area income and admission rates for ACS conditions almost disappears. This may be attributable partly to lower levels of poverty, a more ethnically and racially homogeneous population, and fewer pockets of concentrated poverty. These factors should be explored with

"The contrast between Toronto and the major US. cities studied is startling."

further research. However, U.S. communities with more homogeneous populations and lower rates of poverty still experienced substantial differences between high- and low-income areas; these differences persisted, even when we excluded ZIP code areas with the highest concentrations of poverty (Exhibit 2).

SOME DIFFERENCES BETWEEN rich and poor areas in Toronto remain, even with universal coverage and presumably reduced economic barriers to care: Low-income areas had 39 percent higher ACS rates than more affluent areas in Toronto. These higher rates may be attributable to differences in disease prevalence among low-income populations generally (in which many chronic diseases are more prevalent), and also may reflect noneconomic or quasi-economic barriers that make obtaining care more difficult for low-income patients (such as getting time off from work, arranging child care, or simply getting transportation to a care site).[4] There also may be cultural factors and care-seeking behavior that contribute to these differences and affect utilization rates, even with universal coverage. The potential impact of these factors is illustrated further in the two other Ontario cities studied, where the association between ACS rates and income was strong (possibly reflecting greater uniformity in practice style in these smaller communities), but the difference in mean rates between low- and high-income areas remained small.

Lessons for U.S. policymakers. The lessons for U.S. policy makers at the national and local levels are clear: There will be no easy answers for improving access. An insurance card alone will never assure the elimination of all barriers to timely and effective ambulatory care. Even in states such as New York that have broad Medicaid coverage (including, for example, "state-only" programs for single adults and childless couples), or in Ottawa and Hamilton, which have the advantages of universal coverage, rates of preventable hospitalizations remain associated with area income. Clearly, more study is required to understand how local health care delivery systems can more effectively reduce noneconomic barriers to care, as seems to have happened in Toronto and in some areas of Miami (at least among the Cuban American population). With expansion of insurance coverage off the table in U.S. policy debates, action to reduce these other barriers to access may improve outcomes and

reduce the costs associated with preventable hospitalizations.

U.S. prognosis. The twelve-year trend data for New York City document the stability of ACS rates at the ZIP code level and provide some encouragement for the use of this measure as a monitoring and evaluation tool. However, the data also demonstrate that the situation generally is growing worse, not better, for low-income Americans. In 1993-1994 New York invested more than $60 million to improve primary care services in areas with high ACS rates, and the rate of increase in ACS admissions has begun to level off in low-income areas. However, economic pressures on providers who historically have delivered care to low-income populations are likely to become increasingly acute in today's climate. The ability to shift costs or otherwise raise funds to cover the expenses of uninsured patients or Medicaid reimbursement shortfalls will, no doubt, become more and more. difficult.

Asthma admissions. The findings related to asthma admissions illustrate the complexities of interpreting small-area analysis findings. Since both high- and low-income areas in New York City have experienced increases in admission rates for asthma, worsening access to care is an unlikely explanation. Changes in physician practice style may account for some of the increase, but the increase is mostly among children, and admission decisions for asthma typic cally are made in emergency rooms, often by physicians treating both children and adults. A third, equally alarming cause may be a decline in environmental quality, either from deterioration in air quality or deficiencies in housing or sanitation. The largest increases in asthma admission rates tend to be clustered in certain areas of the city. Clearly, further research to evaluate the impact of physician practice style and environmental factors is needed.

Some good news. Our findings do provide one kernel of good news for policymakers. While ACS admission rates increased during the study period for the population under age sixty-five, rates (excluding asthma) actually declined during the period for children, even for children in low-income areas. Since the inception of Medicaid, efforts to improve access to care for low-income Americans have focused on children. Categorical eligibility for Medicaid is tilted strongly toward young children, and many community-based initiatives funded by federal, state, and local agencies have specifically targeted children. At a time when public opinion generally discounts the effectiveness of government initiatives, this modicum of success is encouraging.

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NOTES

1. J. Billings. 'Consideration of the Use of Small Area Analysis as a Tool to Evaluate Barriers to Access," in Health Resources and Services Administration, *Consensus Conference on Small Area Analysis,* DHHS Pub. no. HRSA-PE 91-1[A] (Washington: U.S. Department of Health and Human Services, 1990); J. Billings et al., "Impact of Socioeconomic Status on Hospital Use in New York City," *Health Affairs* (Spring 1993): 162-173; J.S. Weissman, C. Gatsonis, and A.M. Epstein, "Rates of Avoidable Hospitalizations by Insurance Status in Massachusetts and Maryland," *Journal of the American Medical Association* 268, no. 17 (1992): 2388-2394; M. Millman, ed., *Access to Health Care in America* (Washington: National Academy Press, 1993); The Robert Wood Johnson Foundation, *Access to Health Care: Key Indicators for Policy* (Princeton, N.J.: RWJF, November 1993); National Committee for Quality Assurance, *Health Plan Employer Data and Information Set* (Washington: NCQA, 1993); and A. Bindman et al., "Preventable Hospitalization Rates and Access to Health Care," *Journal of the American Medical Association* 274, no. 4 (1995): 305-311.
2. Billings et al., "Impact of Socioeconomic Status on Hospital Use."
3. We also examined the level of variation in income (percentage of households with income less than $20,000 Canadian) among Toronto areas to help understand whether this might contribute to lower levels of association between ACS admission rates and area income. However, the coefficient of variation for area income in Toronto was comparable to most other areas studied (see Exhibit 1). In addition, we randomly excluded fifty and seventy higher-income areas from the Toronto database to simulate greater income variation, and doing this had no impact on our findings.
4. National Center for Health Statistics, *Current Estimates from the National Health Survey, United States, 1987-1990,* Vital and Health Statistics, Series 10, nos. 168, 173. and 176 (Hyattsville, Md.: NCHS, 1987-1990).