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Census Effects on Access to Health Care

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The Presidential Members of the U.S. Census Monitoring Board present the research findings of Dr. Darrell Gaskin, "The Effects of Using Unadjusted Data on Measures of Access to Health Care."

The study finds that the 1990 census undercount overestimates preventable hospitalizations, a rate used to determine access to health care. Furthermore, Gaskin notes that systematic undercounting makes minority communities less attractive for private investment and development, such as where to place new doctor offices or hospitals.

Sincerely,

Gilbert F. Casellas, Co-Chair

The Effects of Using Unadjusted Data on Measures of Access to Health Care

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Executive Summary

Using of unadjusted census data can distort measures of access to care. On one hand it exaggerates the problems in access to care and on the other hand it minimizes the problems of physician and hospital shortages. In particular, unadjusted data inflates incidence rates, indicators of unmet health care needs, and provider per capita measures, which are all indicators of provider availability.

Typically, advocates for using adjusted census data argue that the systematic undercounting of minority populations results in a loss of needed public funds for publicly supported/provided services that are allocated on a per capita basis. However, there is another part of the problem created by using unadjusted census figures for minority communities. The systematic undercounting of minority populations also makes their communities less attractive for private investment and development. Because of this undercounting, prevalence and incidence rates, based on unadjusted census figures, will always be overestimates. This overestimation will be worse in areas with large minority communities. Hence, the unadjusted data serves to inflate rates of mortality, morbidity, injuries, accidents, crime and other statistics used to gauge the problems and challenges facing communities. The overall effect is to exaggerate the risks associated with living in minority communities, making them less attractive relative to other communities for private enterprise and investors.

In this brief, this point is illustrated using rates of preventable hospitalizations - a measure of access to primary health care. I calculated county rates of preventable hospitalizations using both the adjusted and unadjusted census data by race and ethnicity. A comparison of the rates reveals that the rates calculated using unadjusted data are higher than those calculated with adjusted data. In comparison to Whites, the overestimation is six times greater for African Americans and eight times greater for Hispanics. In addition, the overestimation was greater for rural counties compared to urban counties, especially for African American and Hispanic rural residents. Rates of preventable hospitalizations, in counties with high poverty rates and with high percentages of adults with less than a high school education were also inflated by the unadjusted census data. The implication of this overestimation is to exaggerate the problems and challenges facing minority, rural, poor and poorly educated communities. Hence, this discourages individuals, employers, health care providers and health plans from investing in these communities.

Health care provider availability measures are inflated by the systematic undercounting of minority populations in the census. Physician per capita and hospital beds per capita are common ratios used to measure the supply of health care providers in a county. Using the unadjusted data to calculate these ratios suggest that counties have more physicians and hospital beds per capita than they actually have. Such information is misleading in determining the need for additional physicians and hospital beds. Given that undercounting is not random, all counties are not affected the same way. In particular, rural counties and counties in Texas, California, Georgia, Colorado, Mississippi and New Mexico are most likely to be affected. Also, counties with high percentages of minorities and large poverty populations are more likely to be

misrepresented. These results show that public policy makers and private investors who are trying to assess the communities' needs for additional health care providers should be wary of unadjusted population estimates. While for most counties the difference in provider per capita data is marginal, a significant number are disproportionately clustered in six states. In particular, some rural counties, counties with large minority and poor populations will be mis-characterized to their detriment. Analysts may incorrectly conclude that these areas have sufficient or excess health care resources when they actually do not.

Introduction and Background

Researchers have measured access to medical care by tracking rates of adverse health outcomes or the availability of health providers. The Institute of Medicine's 1993 report, Access to Health Care in America, recommended the use of preventable hospitalizations as an objective measure of access to health care. In the health service research literature these conditions are also referred to as avoidable hospitalizations and ambulatory care sensitive conditions. Preventable hospitalizations are those that ***might not*** have occurred had the patient received appropriate and timely outpatient care, in the case of acute health problems — as well as effective, timely, and continuous care for certain chronic disease conditions (Millman 1993). Examples of preventable hospitalizations are those admissions for a primary diagnosis of: cellulitus, dehydration, kidney and urinary tract infections, pneumonia, angina, chronic obstructive pulmonary disease, or congestive heart failure.

Rates of preventable hospitalizations can be used to evaluate the performance of communities' primary care delivery systems and identify communities with potential problems with access to ambulatory care. Health services researchers have established the association between preventable hospitalizations and socioeconomic and demographic factors. Billings and colleagues (1993 and 1996) report that residents of low income zip codes had higher rates of preventable hospitalizations than residents of high income zip codes. They report that these differences existed in urban areas across the nation and persisted over time, despite expansions in Medicaid and health insurance reforms in the early 1990s. Bindman and colleagues (1995) report that rates of preventable hospitalizations were inversely related to community measures of access to care even after controlling for demographic, income and health differences across populations. Weissman and colleagues (1993) find that Medicaid and uninsured patients were more likely to be admitted to a hospital for avoidable conditions than insured patients. Pappas and colleagues (1997) report class and race difference in rates of preventable hospitalizations. They find that rates were higher for residents of middle and low-income areas and were higher for African Americans than for Whites. Gaskin and Hoffman (2000) examined race and ethnic disparities in preventable hospitalizations. They find that Hispanic children, working-age African Americans, elderly African Americans and elderly Hispanics were more likely to be hospitalized for an avoidable condition than comparable White patients.

Most studies on preventable hospitalizations relied on data collected by the Census Bureau to construct population-based rates of preventable hospitalizations. Most researchers are interested in the relationship between rates of preventable hospitalizations and demographic and socioeconomic factors. Systematic bias related to these demographic variables could seriously affect the results of these analyses. Undercounts of minority populations would bias rates of preventable hospitalizations upward in communities with large minority populations. This undercounting can seriously affect estimates of the impact of poverty, educational attainment and location on preventable hospitalizations. This project determines effects of using uncorrected data on preventable hospitalization research. I compare rates of preventable

hospitalizations using corrected and uncorrected data and examine the effects on rural versus urban areas, high poverty versus low poverty areas, highly educated versus poorly educated areas.

The numbers of health care providers per capita are commonly used measures of the availability of health care providers in a geographic area. The Bureau of Health Professions uses the numbers of primary care physicians, dentists and mental health professionals per capita to determine whether counties or part of counties should be designated a health professional shortage area. Similar to rate of preventable hospitalizations, systematic undercounting of minority population will bias these ratios upward in communities with large minority populations. This project explores whether the use of unadjusted data would affect the designation of a county as a health professional shortage area. I also identify which counties' supply of health care resources would be distorted the most by using unadjusted population data to calculate provider per capita measures.

Data and Methodology

To study the effects on rates of preventable hospitalizations, I used primarily 1996 hospital discharge abstract data from 13 states: Arizona, California, Florida, Illinois, Massachusetts, Missouri, New Jersey, New York, Pennsylvania, South Carolina, Virginia, Washington and Wisconsin. The 13 states chosen for this analysis were based upon the availability of either race or health maintenance organization (HMO) enrollment information in the discharge data. In 1996, more than 42 percent of the nation's population resided in these states. Hispanic Americans were over-represented while African Americans and White Americans were slightly under-represented in the 13 state sample. In 1996, 60 percent of the nation's Hispanic population resided in these ten states due to the presence of California, Florida and New York in the study. More than 40 percent of African Americans and White Americans resided in these states. The state inpatient discharge data contain the following information for each patient: age, sex, race, Hispanic origin, primary and secondary diagnoses, primary and secondary procedures, primary source of payment, ZIP code and county of residence. The race and Hispanic origin information was not reported in the Illinois, Washington and Wisconsin data. Therefore, they were excluded from tabulations by race and Hispanic origin.

For each county in each state, I calculated the number of discharges for avoidable conditions. In particular, I calculated total preventable hospitalization, preventable hospitalizations for Whites, African Americans, Hispanics, and other races (i.e., Asians, Pacific Islanders and Native Americans). To calculate rates of preventable hospitalizations, I used the county-level adjusted and unadjusted data for total, White, African American, Hispanic and other races. The population data is from the 1990 Census. To make it comparable to the 1996 discharge data, I multiplied each population figure by a growth factor equal to the change in the county's population from 1990 to 1996 as estimated by the Census Bureau and reported in the Bureau of Health Professions' Area Resource File.

The other data used in the analysis were: the urban-rural designation, the 1995 poverty rate and the percentage of persons 25 years and older who do not have a high school education. The source of this data is the 1999 Area Resource File compiled by the Office of Research and Planning of the Bureau of Health Care Professions. To analyze the effect of systematic undercounting of minority populations, I divided the counties by location (urban versus rural), poverty level (low - less than 9.6 percent versus high - greater than 16.3 percent) and educational attainment (low - greater than 27.2 percent versus high - less than 27.2 percent). I then compared the rates of preventable hospitalizations for the entire population and the racial and ethnic subgroups across the groups of counties. T-tests were used to distinguish statistically significant differences. The analysis was performed by calculating average rates of

preventable hospitalizations, un-weighted and weighted, by county population. I report the findings from the un-weighted analysis. However, the findings did not change when the averages calculated weighting by county population.

To study the effects on rates of provider per capita, I used adjusted and unadjusted county level population data from the 1990 Census. This data was linked to the numbers of general hospital beds and primary care physicians in each county in 1990 from the Area Resource File. I defined primary care physicians as general and family practitioners, general internists, pediatricians, obstetricians, and gynecologists. I calculated hospital beds per capita and primary care physicians per capita using both the adjusted and unadjusted data. I compared the differences between the adjusted and unadjusted ratios and identified the ten percent of counties with the largest percentage difference. The counties with the greatest change were examined by location, percentage of the population that was minority in 1990 and 1989 poverty rate. The findings are reported below.

Findings

Systematic undercounting of minorities in the 1990 census does result in overestimation of the rate of preventable hospitalizations for African American and Hispanics. Table 1 reports the raw rates of preventable hospitalizations using adjusted and unadjusted census data. (The rates are not adjusted by age.) The percentage difference in the overall rates of preventable hospitalizations between unadjusted and adjusted data is 1.23. However, the differences for African Americans and Hispanics were 4.49 and 5.98 respectively. These differences between the rates calculated using the unadjusted and adjusted data were statistically significant.

Table 1. Rates of Preventable Hospitalizations by Race and Ethnicity Comparing Unadjusted to Adjusted Census Data.

	Unadjusted Data	Adjusted Data	Percentage Difference Between Unadjusted and Adjusted Rates
Total	18.083	17.863	1.23
African Americans	21.503	20.578	4.49
Hispanics	13.553	12.788	5.98
Other Races	14.439	14.318	0.84
Whites	18.749	18.618	0.70

Table 2 reports that overestimation of overall rates of preventable hospitalizations was greater in urban counties relative to rural counties, poor counties relative to wealthy counties and poorly educated counties relative to well-educated counties. These differences were statistically significant. The overall urban-rural results were due to changes in the rates for other races. However, for African Americans, Hispanics and White residents of rural counties the undercounting resulted in a greater inflation of rates of preventable hospitalizations compared to urban residents.

Table 2. Rates of Preventable Hospitalizations by Location, Poverty Level and Educational Attainment, Comparing Unadjusted to Adjusted Census Data.

		Unadjusted Data	Adjusted Data	Percentage Difference Between Unadjusted and Adjusted Rates
Location	Rural	19.370	19.171	1.04
	Urban	14.062	13.902	1.15
Poverty Level	High	21.162	20.824	1.62
	Low	13.181	13.101	0.61
Educational Attainment	Low	20.065	19.832	1.17
	High	14.259	14.126	0.94

These differences by location, poverty level and educational attainment were mediated by the racial and ethnic composition of the county. As shown in Table 3, the rate of preventable hospitalization for African Americans in rural counties was 4.87 percent higher compared to African Americans in urban areas at 3.87 percent. Similarly, African Americans in high poverty counties and counties with low educational attainment had their rates of preventable hospitalizations inflated by 7.42 and 5.1 percent compared to 3.84 and 3.44 percent in urban areas. A review of table 3 shows a similar pattern of inflation of the rates of preventable hospitalization for Hispanics. The rates for Whites were similarly inflated but by less than 1 percent in every instance.

Table 3: Percentage Difference between Unadjusted to Adjusted Rates of Preventable Hospitalizations for African Americans, Hispanics, Whites, Comparison by Location, Poverty Rate and Educational Attainment

		African Americans	Hispanics	Whites
Location	Rural	4.87	6.11	0.81
	Urban	3.87	5.42	0.54
Poverty Level	High	7.42	7.19	0.79
	Low	3.84	4.68	0.42
Educational Attainment	Low	5.10	6.26	0.73
	High	3.44	5.52	0.66

For most counties, using the unadjusted data had a relatively small effect on provider per capita ratios. The average impact was a 1.4 percent change for physicians per capita and a 1.1 percent change for hospital beds per capita. However, there were counties where the change in provider-to-population ratios was substantial. Ranking the counties by the percentage change in physician and hospital beds to population ratios shows that changes for the counties in the top ten percentile ranged from about 2.5 to 28 percent on both measures. Table 4 reveals that rural counties not adjacent to metropolitan areas were most likely to have the physician-to-population ratio substantially inflated by the unadjusted population data. The effect on hospital beds per capita was more evenly distributed by location. Rural counties not adjacent to an MSA and counties in an MSA were more likely to have inflated hospital beds-to-population ratios. The

counties in the top tenth percentile were located primarily in six states Texas, California, Colorado, Georgia, Mississippi and New Mexico. Over 20 percent of these counties are in Texas. Washington D.C., which is considered to have too many physicians and hospital beds, is also among this top ten percent.

Table 4: Urban-Rural Distribution of Counties with the Greatest Percentage Change in Primary Care Physicians and Hospital Beds Per Capita by Designation

Urban - Rural Designation	All Counties	Ten Percent of Counties with Greatest Change in Primary Care Physicians Per Capita	Ten Percent Counties with Greatest Change in Hospital Beds Per Capita
Metropolitan	9.62	8.44	10.42
Rural Adjacent to MSA	44.51	34.42	43.32
Rural Not Adjacent to MSA	45.87	57.14	46.26

The error in the provider to population ratios was greater for counties with high poverty rates and high percentages of minority residents. As shown in tables 5 and 6, all of the counties with changes in their provider-to-population ratios of greater than 10 percent were counties with high poverty and minority populations.

Table 5: States with the Most Counties with the Greatest Percentage Change in Primary Care Physicians and Hospital Beds Per Capita by Designation

Poverty Level	Percentage Change in Primary Care Physicians Per Capita			Percentage Change in Hospital Beds Per Capita		
	2.7% to 5.3%	5.3% to 10%	greater than 10%	2.5 % to 4.4%	4.4% to 10%	greater than 10%
Low Poverty (less than 11.2%)	7.22	4.17	0.0	7.61	0.0	0.0
Medium Poverty (between 11.2 and 20.4)	37.18	0.0	0.0	39.49	11.54	0.0
High Poverty (greater than 20.4%)	55.6	95.83	100.0	52.90	88.46	100.0

Table 6: Association between the Percentage of the Non White County Residents and the Percentage Change in Primary Care Physicians and Hospital Beds Per Capita by Designation

Percent of Non-White Residents	Percentage Change in Primary Care Physicians Per Capita			Percentage Change in Hospital Beds Per Capita		
	2.7% to 5.3%	5.3% to 10%	greater than 10%	2.5 % to 4.4%	4.4% to 10%	greater than 10%
Less than 1.5%	1.81	0.00	0.0	0.36	0.00	0.00

Between 1.5% and 19.9	35.74	12.50	0.0	36.23	3.85	0.00
Greater than 19.9%	62.45	87.50	100.0	63.41	96.15	100.00

Conclusions and Implications

The systematic inflation of access to care measures are harmful because they inflate the preventable hospitalization rate and exaggerate per capita hospital and doctor allocation. The upward bias of preventable hospitalization rates in African American and Hispanic communities exaggerates the problems with the primary care delivery systems in these communities. This inflation of the rates of preventable hospitalizations suggests that residents of these communities have poor care seeking habits, i.e., they tend to delay seeking medical care until hospitalization is necessary. This inaccurate portrayal of overuse of hospital services will tend to make these communities less attractive to health plans. This would tend to be reflected in higher insurance premiums for community rated health plans.

The rate of preventable hospitalizations is only one incidence rate used to evaluate the well-being of communities. Other incidence and prevalence rates such as death rates, disease rates, health care cost and utilization rates, accident statistics and crime rates are susceptible to this flaw in the Census data. Systematic undercounting of African Americans and Hispanics will tend to exaggerate the risks associated with living in their communities. These exaggerated risks tend to discourage potential employers, businesses, insurers, health care providers, investors, and homeowners from locating and investing in these communities. Hence, the systematic undercounting serves to undermined minority communities' efforts to attract private enterprise and investment, especially those in poor, poorly educated or rural areas.

Furthermore, the inflation of provider-to-population ratio misleads policy makers and private investors about the adequacy of the health care delivery system in communities. Poor and minority communities may appear to have sufficient or an excess of physicians and hospital beds thus discouraging further expansion of their health care delivery systems. Community planners should use adjusted Census data in assessing the health care needs of a community or they may unintentionally steer resources away from poor and minority communities.

Marketing organizations that make Census zip code data available to public officials, businesses and researchers should correct their data for systematic undercounting of minorities. Their clients will then be able to obtain an accurate picture of challenges and problems facing minority communities and realize the opportunities for private and public investment in minority communities.

References

Bindman, AB, K Grumback, D Osmond, M Komaromy, K Vranizan, N Lurie, Billings, and A Stewart. 1995. Preventable Hospitalizations and Access to Health Care. JAMA 274(4):305-11.

Billings, J, L Zeitel, J Lukomnik, TS Carey, AE Blank, and L Newman. 1993. Impact of Socioeconomic Status on Hospital Use in New York City. Health Affairs 2:162.

Billings, J, GM Anderson, and LS Newman. 1996. Recent Findings on Preventable Hospitalizations. Health Affairs 15(3): 239-49.

Gaskin D, C. Hoffman. 2000, Race and Ethnic Differences in Preventable Hospitalization Across

Ten States, Medical Care Research and Review 57(Supp. 1);85-107.

Millman, M. 1993. Access to Health Care in America. Institute of Medicine. Washington, DC: National Academy Press.

Pappas, G, WC Hadden, LJ Kozak, and GF Fisher. 1997. American Journal of Public Health. 87(5):811-16.

Weissman, JS, C Gatsonis, and AM Epstein. 1992. Rates of Avoidable Hospitalization by Insurance Status in Massachusetts and Maryland. JAMA 268(17):2388-94.