Health Care Disparities Research:
Using the National Health Care Surveys

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Abstract

The National Health Care Surveys are a family of nationally-representative provider-based surveys that collect data about health care providers, their patients, and their care. The surveys cover health care providers across a broad spectrum of ambulatory, hospital, and long-term care settings. The resulting data are used in many ways, including to assess disparities in quality of and access to care, and differences in health status among different U.S. populations. We present an overview of the surveys and the data that each collects. Examples will be provided of analyses that characterize disparities according to race and ethnicity. Initiatives to better assess racial and ethnic disparities are also described.

Key Words: health care, race, ethnicity, disparities, government statistics, National Health Care Surveys

1. Background and Methods

Reducing disparities in health and health care are important national policy goals. The terms "health disparity" and "health care disparity" have been defined differently by different authors. Although a disparity refers to a difference in health or health care across racial, ethnic, or socioeconomic groups, not all differences are thought to be disparities. To many, disparity reflects an inequity rather than simply a difference.[1] In this paper, we provide information on some data available to describe differences in health care delivery across racial and ethnic groups, and on some of the variables available to examine relationships between race or ethnicity and health care delivery. We provide information on the types of variables available to generate hypotheses about underlying causes of disparities. In addition, we present information about the methodological strengths and limitations of these data. Finally, we discuss directions for the future.

The National Health Care Surveys are a family of nationally-representative provider-based surveys conducted across the spectrum of health care settings, including physician offices, acute care hospitals, and long-term care facilities. Data are collected using multi-stage sampling techniques. Depending on the survey, a stratified random sample of providers may be selected, or a stratified random sample of providers may be selected within specific geographic primary sampling units. For each provider sampled, a random sample of health care encounters, current patients, discharged patients or a combination of current and discharged patients is selected. The survey data are weighted to reflect the differential sampling probabilities of some observations compared with others as well as to adjust for non-response. For links to survey websites and details about the various surveys see Table 1.

An important distinction between the National Health Care Surveys and other surveys of the National Center for Health Statistics is that the former are provider-based. These provider-based surveys are quite different from the traditional population-based surveys and have unique strengths. In particular, they offer researchers the chance to examine associations among health care organizations, clinical providers, patient characteristics, and the content of care delivered. The specific data elements collected vary from setting to setting as appropriate. Examples of data elements common to most surveys include attributes of the health care organization such as source of revenue, ownership, patient volume or bed size, staffing patterns, and use of electronic medical records and other health information technologies; attributes of the clinician or caregiver, such as training, educational background and demographics; attributes of the patient, such as demographics, diagnoses, and expected source of payment; and attributes of clinical management, such as procedures performed, duration of visit or length of stay, medications prescribed or administered, and disposition. Analysis of variables measuring attributes of providers or health care organizations and their relation to content of care and differences in content of care for different groups may provide a particularly important opportunity for understanding and addressing sources of disparities in health care delivery.

These data may also be used to analyze the total use of health care in different settings by different population groups; differences in total use in different settings may reflect disparities in access to care or result in disparities in quality of care delivered.

Table 1. Overview of the National Health Care Surveys				
Survey Setting	Type of Data	Years Fielded	Most Recent Year Available	Number Respondents in Most Recent Year Available
Physicians, office-based National Ambulatory Medical Care Survey (NAMCS) www.cdc.gov/nchs/namcs.htm	Office-based physicians, patient visits	1973-1981, 1985, 1989-present	2006	1,269 physicians 29,392 visits
Emergency and outpatient departments National Hospital Ambulatory Medical Care Survey (NHAMCS) www.cdc.gov/nchs/nhamcs.htm	Hospital emergency and outpatient departments, patient visits	1992-present	2006	389 hospitals 35,849 ED visits 35,105 outpatient visits
Inpatient departments National Hospital Discharge Survey (NHDS) www.cdc.gov/nchs/nchs/nhds.htm	Hospitals, inpatient discharges	1965-present Re-design 2010	2006	438 hospitals 376,328 discharges
Ambulatory Surgery National Survey of Ambulatory Surgery (NSAS) www.cdc.gov/nchs/nsas.htm	Hospital and free-standing facilities, visits	1994-1996, 2006	2006	437 facilities 52,233 visits
Nursing homes National Nursing Home Survey (NNHS) www.cdc.gov/nchs/nnhs.htm	Before 2004: nursing homes, current residents, discharged residents; in 2004: nursing homes, current residents, nursing assistants	1973-74, 1977, 1985, 1995, 1997, 1999, 2004	2004	1,174 facilities 13,670 current patients 3,017 nursing assistants
Home and hospice care providers National Home and Hospice Care Survey (NHHCS) www.cdc.gov/nchs/nhhcs.htm	Home and hospice care agencies, current patients, discharged patients; in 2007: also home health aides	1992-1994, 1996, 1998, 2000, 2007	2000	1,425 facilities 7,159 current patients 6,273 discharged patients
Residential care facilities National Survey of Residential Care Facilities	Residential care (including assisted living) facilities, current residents	Under development		

2. Examples of racial and ethnic differences in ambulatory care

2.1 Setting type

Different racial and ethnic groups are known to receive ambulatory care in different settings, some of which may be more appropriate for routine care than others.   The National Ambulatory Medical Care Survey (NAMCS) and the National Hospital Ambulatory Medical Care Survey (NHAMCS) collect data from physician offices (NAMCS),

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hospital outpatient departments (NHAMCS-OPD), and hospital emergency departments (NHAMCS-ED). Data from these surveys may be combined to examine health care use according to setting. Compared with visits made by white patients, a higher percentage of visits by black patients are made to emergency departments (EDs) (Table 2).[2] This occurs both because visit rates in physician offices are lower for black persons than for white persons, and because visit rates in both OPDs and EDs are higher for black persons than for white.[2] One cannot infer that care given at OPDs or EDs is inherently less appropriate than care given in physician offices. However, the fact that black patients use OPDs and EDs more frequently than white patients implies a need to evaluate access to care and quality of care in these two settings. Careful examination of NHAMCS-ED data on reasons for visit and immediacy of need for care by race may also provide insights into differential ED use patterns by black and white patients.

Table 2: Number of visits and percent distribution of visits by setting type, according to race, expected source of payment and the percentage of poverty in patient zip code. National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey, 2006[2]						
Characteristic	Number of visits in thousands	Total	Primary care offices	Medical and surgical specialty offices	Hospital outpatient departments	Hospital emergency departments
				Percent distribution		
Patient race						
White	923,722	100.0	47.2	35.5	8.0	9.2
Black or African-American	140,066	100.0	40.8	21.3	16.8	21.1
Asian	43,742	100.0	56.2	32.2	6.1	5.5
Expected source of payment						
Private insurance		100.0	49.9	35.9	6.8	7.4
Medicaid or S-CHIP		100.0	50.7	16.4	16.9	16.1
No insurance[a]		100.0	32.9	23.2	14.7	29.2
Percentage of poverty in patient's zip code						
Less than 5%	202,428	100.0	47.0	38.7	7.0	7.4
5.00-9.99%	313,522	100.0	47.1	36.4	7.1	9.4
10.00-19.99%	357,552	100.0	47.8	29.8	10.5	11.9
20 % or more	167,122	100.0	45.3	25.5	13.1	16.0

[a]No insurance is defined as having only self-pay, no charge, or charity as expected source of payment

Table 2 shows that the percentages of visits made to EDs with an expected payment source of Medicaid or S-CHIP and without insurance are dramatically higher than the percentage of visits by privately insured patients. This may reflect less access to office-based care among uninsured patients, who may have limited ability to pay for care out-of-pocket, and less access to office-based care among Medicaid patients because of the significant fraction of office-based providers who do not accept Medicaid patients.[3,4] The percentage of ambulatory care visits that are made to EDs also increases with the percentage of poverty in the patient's zip code (Table 2). This may reflect the poorer health status of poorer people, differences in physician supply in different neighborhoods, or other factors.[5,6]

Black persons in the United States are more likely than white persons to be uninsured or on Medicaid, and to be poor.[7,8] To the extent that racial differences in access can be explained by differences in insurance status or poverty, then one may reduce racial disparities by minimizing disparities in insurance status or poverty. In multivariable analyses including race, expected source of payment, and neighborhood poverty, all three predicted a higher percent of ED visits.[2] This suggests that black-white differences in percent of visits to EDs are not entirely explained by differences in income and insurance status. More research is needed to better interpret racial differences that remain after adjusting for neighborhood poverty and expected payment source, and to understand what policies might alleviate disparities coming from differences in insurance status and income.

2.2 Pharmacological management of chronic diseases

Another strength of National Health Care Surveys data is the detailed information about the services delivered at particular encounters. Ma and Stafford's paper on "Quality of U.S. Outpatient Care" illustrates many of the strengths and limitations of the NAMCS/NHAMCS data for monitoring racial and ethnic disparities in service delivery.[9] Because data were collected from a single visit, the authors restricted their focus to care that might reasonably be expected to be delivered at any visit for a particular diagnosis without speculation about what may have occurred at other visits. The authors also restricted their focus to services about which one may judge clinical appropriateness based on the data elements available in NAMCS/NHAMCS (e.g., three coded diagnoses, patient reason for visit, medications prescribed, counseling or screening provided). Overall, the authors constructed 23 process measures related to quality of treatment for specific conditions.

Across these 23 evidence-based indicators, only two statistically significant differences were noted in the content of care between non-Hispanic white and non-Hispanic black patients.[9] One of these practices, prescribing or continuing angiotensin-converting enzyme inhibitors or angiotensin receptor blockers for heart failure, is generally recommended. The second practice, prescribing antibiotics for upper respiratory infections, should generally be avoided. Prescribing angiotensin drugs for heart failure and prescribing antibiotics for respiratory infection were both more common at visits by non-Hispanic black patients compared with non-Hispanic white patients. The authors adjusted for age, sex, and source of data (NAMCS or NHAMCS-OPD). The authors could not address the fact that non-Hispanic white patients are known to visit physician offices more frequently than non-Hispanic black patients, which could be one reason why black patients are more likely to have documentation of receiving a certain service at any particular visit. Information about the severity and type of heart failure (i.e., systolic or diastolic) was also lacking, and may affect the interpretation of the difference in prescribing practices for heart failure. No statistically significant differences were noted between visits by non-Hispanic white and Hispanic patients, possibly reflecting the smaller sample size and reduced power to identify visit attributes of Hispanic patients.

3. Example of racial differences in inpatient hospital care

Figure 1. Age-adjusted hospitalizations for diabetes (as first listed diagnosis), per 1000 with diabetes 1980-2003
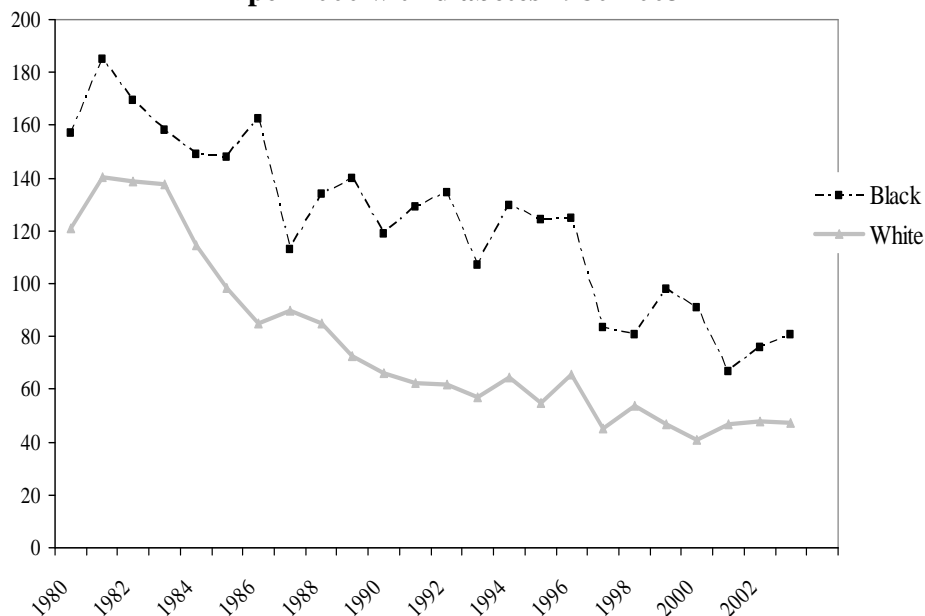
Sources: National Hospital Discharge Survey, National Health Interview Survey. Statistics computed by CDC/Division of Diabetes Translation, http://www.cdc.gov/diabetes/statistics/dmfirst/fig6.htm

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The National Hospital Discharge Survey (NHDS) collects data from inpatient discharges from non-federal acute short-stay hospitals, which account for a substantial portion of total health care spending.[10] Moreover, a hospitalization generally reflects an illness episode that is more severe than that which is treated in an ambulatory setting. Tracking inpatient hospitalizations through population-based surveys may be difficult because these events occur relatively infrequently. Therefore, hospital-based data are useful for monitoring these important events.

Figure 1 compares the age-adjusted trends in diabetes as a first-listed diagnosis per 1,000 white and black persons with self-reported diabetes. Although the available data do not inform us as to whether any one particular hospitalization was preventable, many hospitalizations from diabetes are considered to be preventable through better detection (potentially a function of both access to care and delivery of appropriate care), better medical management, better patient self-management, or a combination of these factors.[11-13] Because NHDS data have high rates of missing race, racial differences in hospital discharges must be interpreted with caution.[14] In the 2003 NHDS, the weighted percent of hospital discharges with diabetes as a first listed diagnosis and missing race was 21%. However, the differences by race noted in figure 1 are so large, that even if one inflated the white rate by 21% under the extreme assumption that all the hospitalizations with diabetes as a first listed diagnoses and missing race were for white patients, there would still be a difference between the two rates.

4. Example of racial differences in long-term care

Nursing homes are an important source of care for short-term recovery after acute hospitalization and for elderly no longer able to perform basic activities of daily living. The National Nursing Home Survey (NNHS) follows a similar design to other surveys described in Section 1, collecting data on nursing homes, their residents, and their care. In addition, the survey collects data about patients at time of admission and on the day of the survey. The 2004 NNHS also included a telephone-based supplement that collected data from nursing assistants who are key providers of nursing home care.

Among the indicators developed to measure quality in nursing homes is the immunization rate of nursing home residents 65 years and older with pneumococcal vaccine.[15] Data from the 2004 NNHS show that 35% of non-Hispanic black nursing home residents over 65 had ever received a pneumococcal vaccine compared with 48% of non-Hispanic white residents, a statistically significant difference (p < .001). An analysis from the 1999 NNHS also indicated that black residents were less likely to have ever received pneumococcal vaccine than white residents, even after adjusting for important individual factors such as age, high risk diagnoses, expected source of payment, length of stay, and activities of daily living, and facility level predictors of vaccination such as ownership and having a formal vaccination program.[16]

5. Analytical techniques that exploit the full value of provider-based survey methods

In Section 1, we mention that provider-based surveys may be valuable for examining relationships among characteristics of health care organizations and patients and racial and ethnic differences in processes of care. However, the statistical methods most commonly used fail to exploit the full potential of these data to study how provider and system attributes affect care. Typically, an analysis of disparities begins by identifying a difference in content or process of care in particular groups of patients. An important next step is to investigate whether differences occur because some groups are treated differently from others within a practice or other organization, or whether patients in different racial or ethnic groups seek care from providers or facilities with different resources or practice styles. Fixed effects models that include an intercept for each provider or organization may be used to shed light on how much of any overall difference in care content occurs within practices or organizations. However, one cannot simultaneously control for fixed effects and identify which provider or organization characteristics are associated with care content. Moreover, small sample sizes from individual providers may lead to limited statistical power to detect "within-provider" differences in care. As a result, more sophisticated analytical techniques, such as hierarchical linear modeling (HLM), are becoming increasingly common.[17]

Figure 2a presents a simple descriptive analysis of 52,207 visits to 391 emergency departments from the 2005 and 2006 NHAMCS. The geometric mean waiting time for treatment for visits made by non-Hispanic black and Hispanic patients is considerably longer than the time for non-Hispanic white patients. These large differences remain in a preliminary model adjusted for age, gender, time of day, triage assessment, and expected source of

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payment (Figure 2b). Results in Figure 2c, however, take into account the facility at which patients of different racial and ethnic groups receive treatment by allowing for ED-specific random intercepts and slopes. Although differences remain statistically significant, the predicted geometric mean waiting times are much more similar across racial and ethnic groups after accounting for the average waiting time at each ED. These figures show that a very large proportion of the racial and ethnic differences in waiting times observed are accounted for by the facilities at which racial and ethnic groups receive treatment. In future work, we hope to identify facility-level factors associated with variability in waiting times across EDs. An important concern relates to the proper way to incorporate survey weights when using HLM, an issue we also hope to further explore.

Figure 2. Waiting for Treatment at U.S. Emergency Departments, Preliminary Results, 2005-2006
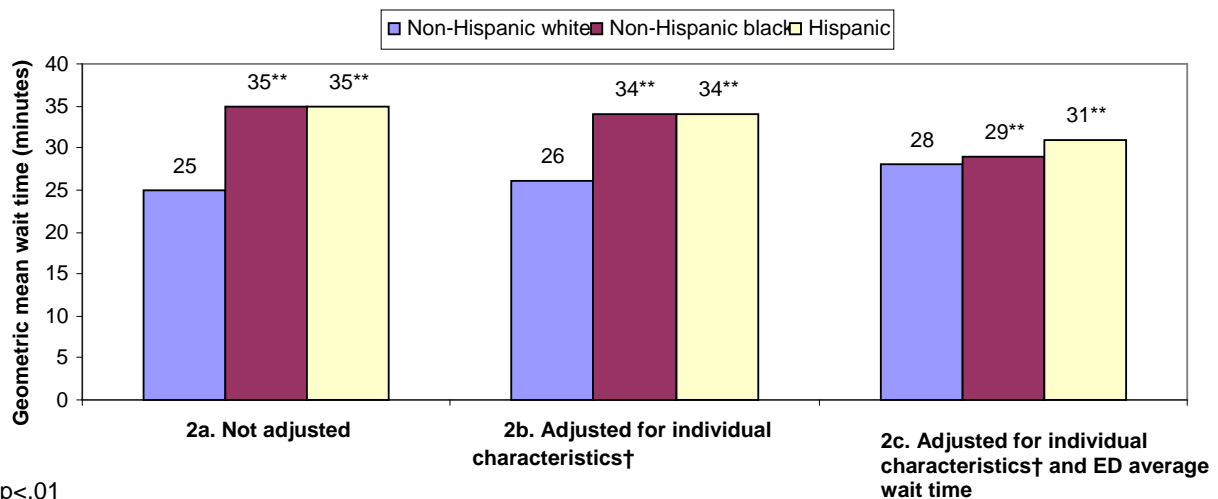
p<.01
† Adjusted for age, sex, time of day, expected source of payment, and triage assessment
Source: National Hospital Ambulatory Medical Care Survey, 2005-2006

6. Methodological concerns, recent improvements, and future plans

One major limitation in conducting disparities research using the National Health Care Surveys is that information about race and ethnicity derived from medical records is limited by the quality of the information contained in the record. Although the validity of race and ethnicity information from provider records has not been studied comprehensively, the limited data we have on the subject suggest that these data are far from perfect.[18-20] A related limitation is the fact that race/ethnicity data are missing for a significant fraction of many of the National Health Care Surveys. For example, in 2006, NHAMCS-ED data were missing race for about 10% of records while Hispanic ethnicity was missing for about 17% of records. In 2006, NAMCS had missing race at 27% of visits and ethnicity at 30% of visits. The NHDS had missing race about 24% of records in 2006; ethnicity was missing about half the time.

For the NAMCS/NHAMCS surveys, the methods for imputation were updated in 2006 to include patient's residential zip code as a key imputation variable. One way to reduce missing data for race in the NHDS is to switch to a system of primary data collection for all hospitals. The current NHDS relies partly on automated data from commercial systems. The automated data collected are missing race more than twice as frequently as the data collected manually from medical records. For a variety of reasons, the NHDS is being re-designed. The re-designed NHDS plans to employ manual data collection at all hospitals in 2010. Hence, the re-designed NHDS should be able to collect more complete race data. Other improvements expected from the re-designed NHDS are discussed further below.

As mentioned previously, most of the surveys described provide information about individual health care encounters without providing information about individuals over time. These data are not obviously translated into population-based estimates because one person may have multiple encounters in a particular setting in a year and another may

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have only a single encounter; these individuals would have different probabilities of having one of their encounters included in the survey.[21]   Hence, by definition, the encounters included in the National Health Care Surveys weight care more heavily for those who use it the most intensively. Individuals without any contact with the health care system in a year have no opportunity for inclusion in any of the National Health Care Surveys.   Starting in 2001, NAMCS and NHAMCS-OPD partly addressed this limitation by including a measure for the number of a patient's previous visits in the past 12 months to the sampled provider. Hence, users may now produce estimates that reflect the total number of persons receiving care from a particular provider.[21] This improvement does not address the over-representation of patients using multiple providers.

Inadequate information about care over time remains an important limitation. However, in 2006 a check box was added to the NHAMCS-ED to indicate whether an ED encounter was for a patient who was discharged from the hospital in the past 7 days.   Pre-testing of a re-designed NHDS includes collecting data on hospital discharges within 30 days of the index discharge, and the potential for linkage with the National Death Index. These plans are intended to facilitate a better understanding of hospital care outcomes and any disparities in these outcomes.

A related limitation is the lack of clinical depth to help interpret the appropriateness of specific care processes. Starting in 2009, the NAMCS will be testing the inclusion of results for lipid tests. If collecting such information is viable, the potential exists to more directly compare the health status of patients treated as well as to more closely examine relationships between care processes and patients' medical conditions.   The pre-test of the re-designed NHDS is collecting more detailed clinical data including an expanded number of discharge diagnoses and some laboratory results.

Finally, small sample sizes for Hispanic, black, and other minority racial and ethnic groups continue to limit the possibilities for analyses. The problem of small sample sizes may grow bigger than it has been in the past for hospital discharge data as the re-designed NHDS includes plans to reduce sample size to accommodate increasing complexity within budget constraints. For all of the National Health Care Surveys, combining multiple years of data effectively increases sample size. However, combining multiple years limits our ability to examine variation in health care processes over time. A more appealing approach would be to over-sample providers in geographic areas which have large minority populations. This approach is theoretically viable, but would require additional funding.

In summary, the National Health Care Surveys offer publicly available nationally-representative data to study racial and ethnic disparities across the spectrum of health care settings. We encourage researchers to use these data to their fullest potential, and invite inquiries and opportunities for collaboration.

Acknowledgements

References

1. Hebert PL, Sisk JE, Howell EA. When does a difference become a disparity? Conceptualizing racial and ethnic disparities in health. Health Aff (Millwood). 2008 Mar-Apr;27(2):374-82.

2. Schappert SM, Rechtsteiner EA. Ambulatory medical care utilization estimates for 2006. National health statistics reports; no 8. Hyattsville, MD: National Center for Health Statistics. 2008.

3. Hing E, Burt CW. Characteristics of office-based physicians and their medical practices: United States, 2005-2006. National Center for Health Statistics. Vital Health Stat 13(166). 2008.

4. S.L. Decker, "Medicaid Physician Fees and the Quality of Medical Care of Medicaid Patients in the USA," Review of Economics of the Household 5 (2007): 95-112.

5. Weber EJ, Showstack JA, Hunt KA, Colby DC, Callaham ML. Does lack of a usual source of care or health insurance increase the likelihood of an emergency department visit? Results of a national population-based study. Ann Emerg Med. 2005 Jan;45(1):4-12.

6. Richman IB, Clark S, Sullivan AF, Camargo CA Jr. National study of the relation of primary care shortages to emergency department utilization. Acad Emerg Med. 2007 Mar;14(3):279-82.

7. Cohen RA, Martinez ME, Free HL. Health insurance coverage: Early release of estimates from the National Health Interview Survey, 2007. June 2008. Available from: http://www.cdc.gov/nchs/nhis.htm.

8. U.S. Census Bureau. "POV01. Age and Sex of All People, Family Members and Unrelated Individuals Iterated by Income-to-Poverty Ratio and Race, 2006". Current Population Survey, 2006 Annual Social and Economic Supplement. http://pubdb3.census.gov/macro/032007/pov/new01_100.htm, last accessed: 9/15/2008.

9. Ma J, Stafford RS. Quality of US outpatient care: temporal changes and racial/ethnic disparities. Arch Intern Med 2005;165:1354-1361.

10. DeFrances CJ, Lucas CA, Buie VC, Golosinskiy A. 2006 National Hospital Discharge Survey. National health statistics reports; no 5. Hyattsville, MD: National Center for Health Statistics. 2008.

11. Harris MI, Flegal KM, Cowie CC, Eberhardt MS, Goldstein DE, Little RR, Wiedmeyer HM, Byrd-Holt DD. Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. adults. The Third National Health and Nutrition Examination Survey, 1988-1994. Diabetes Care. 1998 Apr;21(4):518-24.

12. American Diabetes Association. Standards of medical care in diabetes--2008. Diabetes Care. 2008 Jan;31 Suppl 1:S12-54.

13. *Economic and Health Costs of Diabetes: HCUP Highlight 1*. AHRQ Publication No. 05-0034, January 2005. Agency for Health care Research and Quality, Rockville, MD. http://www.ahrq.gov/data/hcup/highlight1/high1.htm

14. Kozak LJ. Underreporting of race in the National Hospital Discharge Survey. Adv Data. 1995 Jul 6;(265):1-12.

15. National Quality Forum. "National Voluntary Consensus Standards for Nursing Home Care", 2004. http://216.122.138.39/pdf/reports/nursing_homes.pdf , last accessed July 14, 2008.

16. Bardenheier B, Shefer A, Tiggle R, Marsteller J, Remsburg RE. Nursing home resident and facility characteristics associated with pneumococcal vaccination: national nursing home survey, 1995-1999. J Am Geriatr Soc. 2005 Sep;53(9):1543-51.

17. Sullivan LM, Dukes KA, Losina E. Tutorial in biostatistics. An introduction to hierarchical linear modelling. Stat Med. 1999 Apr 15;18(7):855-88.

18. Gomez SL, Le GM, West DW, Satariano WA, O'Connor L. Hospital policy and practice regarding the collection of data on race, ethnicity, and birthplace. Am J Public Health. 2003 Oct;93(10):1685-8.

19. Moscou S, Anders MR, Kaplan JB, Valencia L. Validity of racial/ethnic classifications in medical records data: an exploratory study. Am J Public Health 2003;93(7):1084-86.

20. Riddle BL. On the coding and reporting of race and ethnicity in New Hampshire for purposes of cancer reporting. Ethn Dis. 2005;15(2):324-31.

21. Burt CW, Hing E. Making patient-level estimates from medical encounter records using a multiplicity estimator. Stat Med. 2007 Apr 15;26(8):1762-74.

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