THE ECONOMIC COST OF HEALTH INEQUALITIES IN ARKANSAS

APRIL 2014

AMHC

UAMS
FAY W. BOOZMAN
**COLLEGE OF
PUBLIC HEALTH**

UNIVERSITY OF ARKANSAS
FOR MEDICAL SCIENCES

Your
Tobacco
Settlement
Dollars at
Work
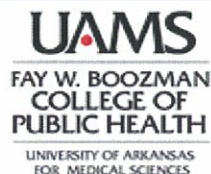
A Report Commissioned by the Arkansas Minority Health Commission

By

J. Mick Tilford, PhD
Professor and Chair
Department of Health Policy and Management
Faye W. Boozman College of Public Health
University of Arkansas for Medical Sciences

Chenghui Li, PhD
Associate Professor
Division of Pharmaceutical Evaluation and Policy
College of Pharmacy
University of Arkansas for Medical Sciences

Sharla Smith, PhD
Instructor
Department of Health Policy and Management
Fay W. Boozman College of Public Health
University of Arkansas for Medical Sciences

FOREWARD

The overarching goal of the Arkansas Minority Health Commission (AMHC) is to be a catalyst in bridging the gap in the health status of the minority population and that of the majority population in Arkansas. To achieve this goal, AMHC focuses on educating communities on healthier lifestyles, promoting awareness of services and accessibility within our current health care system, researching existing disparities in minority populations, and advocating for policies and intervention strategies towards reducing well-documented, disproportionate health disparities in the Arkansas.

In June 2010, AMHC met at Mt. Magazine, Arkansas for a strategic planning process, which entailed in-depth discussions about AMHC's research and policy initiatives. Board members looked at what the most pressing needs were for our state as it related to AMHC's mission and goals. The board concluded that a dearth of state-specific analysis existed regarding the financial impact racial and ethnic health disparities place on our health care system in Arkansas.

They reviewed ways in which AMHC could advance awareness among grassroots constituencies, public health stakeholders and decision-makers about the economic impact of health inequalities in Arkansas. After reviewing the September 2009 release of a national study entitled, *The Economic Burden of Health Inequalities in the United States*, by the Joint Center for Political and Economic Studies in partnership with researchers at Johns Hopkins University and the University of Maryland, AMHC board of commissioners directed that a similar analysis be conducted in Arkansas in partnership with researchers at the University of Arkansas for Medical Sciences.

The report that follows seeks to estimate the economic impact of racial and ethnic disparities in the state. Findings demonstrate that the economic consequences of racial and ethnic health disparities in Arkansas are significant with a price-tag of more than $500 million annually.

AMHC is grateful to Principal Investigator, Dr. J. Mick Tilford, and investigators, Dr. Chenghui Li and Dr. Sharla Smith for their work and dedication on this report. A report that we believe now opens a unique door for increased dialogue and action among Arkansas legislators, public health leaders, advocates, and community influencers to begin to seek collaborative avenues towards successful intervention strategies that can be implemented to reduce disparities and provide a source of revenue savings for our state.

As we improve the health of minority Arkansans, we improve the health status of Arkansas as a whole.

<div style="text-align: right;">

Idonia L. Trotter, JD, MPS
Executive Director
Arkansas Minority Health Commission

</div>

EXECUTIVE SUMMARY

Racial and ethnic disparities in health care that result in worse health outcomes impose both direct and indirect costs on the people of Arkansas. Understanding the costs of health disparities in minority populations provide important information for planning interventions to reduce the burden to the state. It is well known that racial and economic disparities result in significant economic consequences nationally. Given the economic circumstances of Arkansas, it is expected that racial and ethnic health disparities have significant economic consequences for the state of Arkansas. This study, commissioned by the Arkansas Minority Health Commission, sought to estimate the economic impact of racial and ethnic disparities in Arkansas. Using national and state-specific data, the study found that eliminating health disparities for Arkansas minorities would result in a reduction of direct medical care expenditures of $518.6 million. More than 79% of these excess expenditures were attributable to African Americans who have the worst health profile among the racial and ethnic groups in the state. The potential direct medical cost savings for Hispanics was $105 million, representing 20% of the total direct medical costs of health inequalities. Premature death also was significant for African Americans and accounted for $1.7 billion in indirect costs. Findings from the study suggest that targeted interventions to reduce health disparities for minority populations in the state have the potential to generate significant benefits from reductions in both direct medical care and indirect health costs.

INTRODUCTION

Disparities in health care persist despite the 2002 report from the Institute of Medicine that found systematic differences in rates of medical procedures provided to racial and ethnic minorities even after ruling out insurance status, socioeconomic status, and other personal characteristics as potential reasons for these disparities.[1] Minorities are less likely to receive to receive preventive health services and experience a lower quality of healthcare overall.[2] Because racial and ethnic disparities in healthcare can result in poorer health status and premature death, they are likely to generate excessive costs to both public and private health care systems.

A national report on the economic cost of health inequalities in the United States demonstrated that racial and economic disparities in access to quality health care result in significant economic consequences nationally.[3] On average, the excess direct medical care expenditure associated with health disparities for minorities was approximately $60 billion annually. Of this amount, African Americans accounted for approximately $35 billion annually in excess expenditures and Hispanics accounted for $20-24 billion.

In addition to excess medical care costs, racial and ethnic disparities that result in worse health outcomes also create indirect costs in the form of lost workdays and premature death.[4] Estimates from 2008 national report indicate significant indirect costs from health inequalities. In their report on the national impact of health inequalities, LaViest and colleagues estimated the indirect costs amounted to approximately $255 billion per year with African Americans accounting for 77.6% of the total cost.[3] Of the total indirect cost, most was due to the cost of premature death, which accounted for 73.8% of the total. Hispanics also experienced health inequalities that resulted in $55 billion annually in indirect health care costs associated with premature death.

While the cost of racial and ethnic health disparities have been documented at a national level, there is less information describing these costs as they apply to the state of Arkansas. Understanding the costs of health disparities in minority populations provides important information for planning interventions to reduce the burden to the state.[5] Given the economic circumstances of Arkansas, it is expected that racial and ethnic health disparities have significant economic consequences for the state of Arkansas. This study, funded by the Arkansas Minority Health Commission, sought to estimate the economic impact of racial and ethnic disparities in Arkansas.

STUDY METHODS

The goal of the study was to estimate the direct and indirect cost of health disparities in the state of Arkansas. The direct costs include medical care services, prescription drug spending, and other health services paid by public and private payers as well as the patient. The indirect costs include premature death and lost workdays. To achieve the study goal, nationally representative data from two different sources were used. The 2010 Medical Expenditure Panel Survey (MEPS) provides a rich source of data for modeling health expenditures and lost workdays, but cannot be used to make predictions at the state level. Thus, data from the 2008-2010 Behavioral Risk Factor Surveillance System (BRFSS) was used to generate predictions of excess medical expenditures and workdays lost for the state of Arkansas based on model predictions from the MEPS. See the data schematic for the MEPS and the BRFSS in the appendix. All of the methods followed prior work that estimated the economic cost of health disparities nationally.[3]

Direct Medical Costs of Health Inequalities

We first developed a model of health care expenditure using data from 2010 MEPS based on characteristics of the population, especially age, gender, race, and health status. We then applied estimates from this model to adult Arkansans identified from the 2008-2010 BRFSS to estimate health care expenditures for each racial/ethnic group (Hispanic, Non-Hispanic Black, Non-Hispanic White) in Arkansas. The 2008-2010 BRFSS data was pooled to generate sufficient sample sizes for each racial/ethnic group, particularly Hispanics. Even after pooling data, it was not possible to include estimates for Asian ethnicity in the analysis because the sample size was too small. The prediction model used data from 19,636 adults in the MEPS from the three race-ethnicity groups. Total health care expenditures were estimated based on an the person's demographic characteristics (age, gender, race/ethnicity), socioeconomic factors (education, family income, health insurance coverage), location (urban-rural resident), health status measures (self-reported physical health, self-reported mental health, presence of functional limitation, use of assistive equipment, body mass index (BMI), and presence of chronic conditions (diabetes, asthma, heart diseases, and stroke). Total health care expenditures included costs for inpatient, outpatient (hospital, clinic, and office-based visits), emergency room, prescription drugs (excluding over-the-counter purchases), home health services, vision care services, ambulatory services, and medical equipment. Both out-of-pocket costs (excluding insurance premiums) and third-party payments to health care providers were included.

A two-part model was used to estimate health expenditures following prior studies.[6-8] First, a logistic regression model was estimated to predict the probability of having any health care expenditure. Second, a generalized linear model with a gamma distribution and log-link function was used to predict the amount of health care expenditure among those who incurred

some health care expenditure. Based on estimates from the two-part model, we predicted health expenditures for each racial/ethnic group in Arkansas by six age-gender cohorts based on actual health status. The age groups were under 45, 45-64, and 65 or older. We then assigned the average health profile of the best race-ethnicity group to all race-ethnicity groups within each age-gender cohort and generated another set of estimates of the health care expenditure for each race-ethnicity group. The second set of estimates represented the health care expenditure had the health disparity across racial-ethnic groups been eliminated. The difference between the first and second set of estimates represents the excessive health care expenditure associated with health disparities across racial-ethnic groups. The total direct medical costs of health inequalities were calculated as the total excessive health care expenditures summed over all age-gender cohorts for each race-ethnic group.

Indirect costs of lost workdays due to health disparities

The 2010 Medical Expenditure Panel Survey (MEPS) contains information on lost workdays with sufficient sample sizes to generate prediction models. Using data from the MEPS, we estimated a model of workdays lost and then applied this model to adult Arkansans identified from a pooled sample of data from the 2008-2010 Behavioral Risk Factor Surveillance System (BRFSS) N=10,553. The estimates of lost workdays were generated for each racial/ethnic group (Hispanic, Non-Hispanic Black, Non-Hispanic White) in Arkansas. We pooled three years of data from the BRFSS to generate sufficient sample for each racial/ethnic group, particularly Hispanics. Despite pooling three years of data, the analysis could not include people of Asian ethnicity because of small sample sizes (N=44). The prediction model was estimated based on the 19,636 adults in the MEPS data from the three race-ethnicity groups. Workdays lost were predicted based on an individual's demographic characteristics (age, gender, race/ethnicity),

socioeconomic factors (education, family income, health insurance coverage), location (urban-rural resident), as well as health status measures (self-reported physical health, self-reported mental health, presence of functional limitation, use of assistive equipment, body mass index (BMI), and presence of chronic conditions (diabetes, asthma, heart diseases, and stroke).

As in the estimation of direct costs, a two-part model was used to estimate workdays lost. First, a logistic regression model was used to predict the probability of having any lost workdays. Second, a generalized linear model with a gamma distribution and log-link function was used to predict the amount of lost workdays among those who had any lost workdays due to illness. Based on estimates from the two-part model, we generated two sets of predictions for each racial/ethnic group in the state of Arkansas. To generate these estimates, we first divided the sample of adult Arkansans into six age-gender cohorts. The age groups were under 45, 45-64, and 65 or older. Within each age-gender cohort, we first predicted the total lost workdays due to illness for each race-ethnicity group based on their actual health status. We then assigned the average health profile of the best race-ethnicity group to all race-ethnicity groups within each age-gender cohort and generated another set of estimates of the lost workdays for each race-ethnicity group. The second set of estimates represented the reduction in workdays lost had the health disparity across racial-ethnic groups been eliminated. The difference between the first and second set of estimates is the excess workdays lost associated with health disparities across racial-ethnic groups.

Lost workdays include disability days due to illness, injury, or a mental or emotional problem incurred by both individuals who were employed and those who were unemployed at the time of survey. Because the survey questions in the MEPS that asked about workdays lost and disability did not differentiate a full day from a half-day, we used 6 hours per day as the

estimate of a lost workday or disability day following other researchers (Guy et al, 2013).[9] To generate costs from lost workdays, the 2012 median hourly wage for workers in Arkansas was obtained from the Bureau of Labor Statistics and discounted to 2010 dollars using the Current Price Index (CPI). We applied the median hourly wage rate to estimates of total hours of time lost to calculate the indirect costs of health disparities associated with lost workdays.

Indirect costs of premature death from health disparities

To estimate premature deaths associated with health disparities, we obtained the 2010 mortality data file from the National Center for Health Statistics and used it to calculate the number of deaths among adult Arkansans stratified by three age-gender groups. The age groups were under 45, 45-64, and 65 or older. We then obtained the 2010 bridged-race population estimates for each race-ethnicity group in Arkansas by the three age-gender groups produced by the Census Bureau in collaboration with the National Center for Health Statistics (NCHS). Within each age-gender cohort, we calculated the expected number of death for each race-ethnicity group by applying the lowest mortality rate of all three race-ethnicity groups (In all age-gender cohorts, Hispanics had the lowest mortality rate in Arkansas). The difference between the expected number of deaths and the actual deaths represents the excessive deaths due to health disparities across each race-ethnicity group. For each age-gender cohort, we calculated the mean age using the 2008-2010 BRFSS. Following LaVeist, Gaskin, Richard (2009), we then calculated the difference between the mean age of each age-gender cohort and 75 to get an estimate of the years of life lost for each age-gender cohort.[3] The resulting estimate was multiplied by the number of excessive death for each age-gender cohort to get the total number of years of life lost. Years of life lost were calculated for each race-ethnicity group within each age-gender cohort and summed to get the total number of years lost due to premature death. To

convert years of life lost into a cost estimate, we followed LaVeist, Gaskin, and Richard (2009),[3] and valued each year of life lost at $50,000. Multiplying years of life lost by $50,000 provides an estimate of the total indirect costs due to premature death. This is a conservative estimate as many studies now use $100,000 per life year in health economic evaluations.[10]

STUDY FINDINGS

Excess direct medical costs due to health inequalities

Table 1 provides estimates of excess direct medical expenditures due to health disparities in the state of Arkansas. Overall, minority groups had $518.6 million in excess health care costs in 2010, the most recent year that data was available. The majority of excess expenditures (79.6%) were attributable to disparities in health for African Americans, who had the worst health profile of all the racial groups. In comparison, people of Hispanic ethnicity accounted for $105.7 million in excess expenditures in the state or 20.4% of overall excess expenditures.

Table 1. Excess Direct Medical Care Expenditures Due to Health Inequalities in Arkansas (2010)†

Race/Ethnicity	Excess Cost	Lower Bound	Upper Bound
Hispanic	$105.7	$76.4	$135.1
Black	$412.9	$356.6	$469.2
Total	$518.6	$432.9	$604.3

†All expenditures are standardized to 2010 (millions of $US dollars). 95% confidence intervals are listed as lower bound and upper bound. Source: Based on predictions from the Medical Expenditure Panel Survey 2010 and the 2008-2010 Behavioral Risk Factor Surveillance Survey.

Our estimates of excess direct medical care expenditures differ from research conducted nationally. Prior research found that people of Hispanic ethnicity accounted for 37.6% of excess direct medical expenditures whereas we found a much higher percentage attributable to African-Americans and a lower percentage attributable to Hispanics. It is not clear whether our estimates represent a difference in health status between the two populations or differences in population characteristics.

Estimates of the Excess Cost of Lost Workdays

Table 2 provides estimates of the excess costs of lost workdays in the state of Arkansas due to health inequalities. The estimated total cost of lost workdays to the state is $160.6 million in 2010 dollars. African Americans accounted for the largest percentage (83.8%) of the excess cost of lost workdays. The percentage of the total cost of lost workdays attributable to African Americans in Arkansas is closer to national estimates for the same cost (72.9%), but remains higher than national estimates as was the case for excess direct health care costs.

Table 2. Excess Cost of Lost Workdays in Arkansas from Health Inequalities (2010) †

Race/Ethnicity	Excess Cost	Lower Bound	Upper Bound
Hispanic	$25.9	$16.2	$35.7
Black	$134.7	$110.9	$158.4
Total	$160.6	$127.1	$194.1

† All expenditures are standardized to 2010 (millions of $US dollars).
Source: Based on calculations using the Medical Expenditure Panel Survey 2010 and 2008-2010 BRFSS.

The cost of lost workdays was slightly higher to the state of Arkansas relative to the same costs nationally. In national estimates, excess workdays lost were estimated at approximately 21.9% of the excess health care costs. In the state of Arkansas, excess workdays lost accounted

for 31.0% of estimated excess health care costs. Thus, it appears that the overall estimate of excess workdays lost appears in line with prior estimates, but there are some differences between minority groups in the state of Arkansas and the nation as a whole that account for the discrepancy in findings.

Estimates of Excess Costs from Premature Deaths

Table 3 provides estimates of the number of excess premature deaths and excess costs from these premature deaths in the state of Arkansas. Table 3 reports excess premature deaths for only African Americans as our data did not find evidence of excess premature deaths in Hispanics. Indeed, the Hispanic population had the best survival profile by age group for all of the different races and ethnicities studied.

Table 3. Premature Deaths and Excess Costs for African Americans in Arkansas Due to Health Inequalities

Age Group	Excess Deaths Females	Excess Deaths Males	Excess Costs Females*	Excess Costs Males*	Total Excess Cost*
18-44	122	164	$273	$355	$627
45-64	393	488	$424	$512	$936
65+	753	639	$56	$59	$115
Total	1,268	1,291	$753	$926	$1,678

† All expenditures are standardized to 2010 (millions of $US dollars).
Source: Source: Based on predictions from the Medical Expenditure Panel Survey 2010 and the 2008-2010 Behavioral Risk Factor Surveillance Survey.

The data in Table 3 include excess death estimates for both African American females and males by age group. The estimates show that excess deaths are higher in people age 65+ relative to the younger age groups. However, because years of life lost are greater in the younger age groups (due to longer potential life expectancy), the excess cost estimates are much higher for the younger age groups relative to the older age groups.

Overall, we find a large impact of excess premature deaths attributable to African Americans in the state of Arkansas. With over 1,200 excess premature deaths to both African Americans females and males due to health inequalities, the total cost of these lost lives is approximately $1.7 billion dollars in 2010. Our estimates are consistent with national findings. We estimate that excess direct health expenditures are approximately 24.6% of the cost of premature deaths in Arkansas, whereas this same percentage is 24.0% nationally.

Table 4. Five Leading Causes of Death in Arkansas by Race, 2010 †

Condition Rank for all Arkansans	Causes of Death	Black deaths per 100,000	White Deaths per 100,000	Difference
1	Heart Disease	379.0	301.2	77.24
2	Cancer	324.0	272.8	51.18
3	Cerebrovascular disease	103.1	69.6	33.55
4	Accidents	51.4	66.7	(15.36)
5	Diabetes	85.7	30.2	55.46

† Source: Based on calculations using the 2010 NCHS.

Table 4 provides further evidence on the health disparities for African American citizens relative to white citizens in the state of Arkansas. Table 4 provides age-gender adjusted deaths per 100,000 for the leading causes of death for African-American and white citizens of the state of Arkansas. These rates were age-gender adjusted using the bridged-race US population estimates for 2010 from NCHS. The data in Table 4 demonstrate the significant differences in disease burden to white and African American citizens. For heart disease, African American citizens are 26% more likely to die from this cause relative to white citizens of Arkansas.

CONCLUSIONS

This study used methods similar to a prior study to estimate the economic costs of health disparities for racial and ethnic minorities in the state of Arkansas. Our findings are consistent with the prior study in that the economic consequences of racial and ethnic health disparities appear to be significant. We find that the excess cost from health disparities attributed to minorities in the state exceed $500 million annually. In contrast to the prior national estimates of the cost of health disparities, we find a large proportion of the excess direct and indirect cost can be attributed to African American citizens. We find that the excess cost of premature death is largely attributable to African American citizens despite our finding that the overall cost of premature death appears consistent with national estimates. Differences in findings for racial and ethnic groups in Arkansas may be a function of the population characteristics of the citizens of Arkansas or data differences at the state level from our modeling strategy.

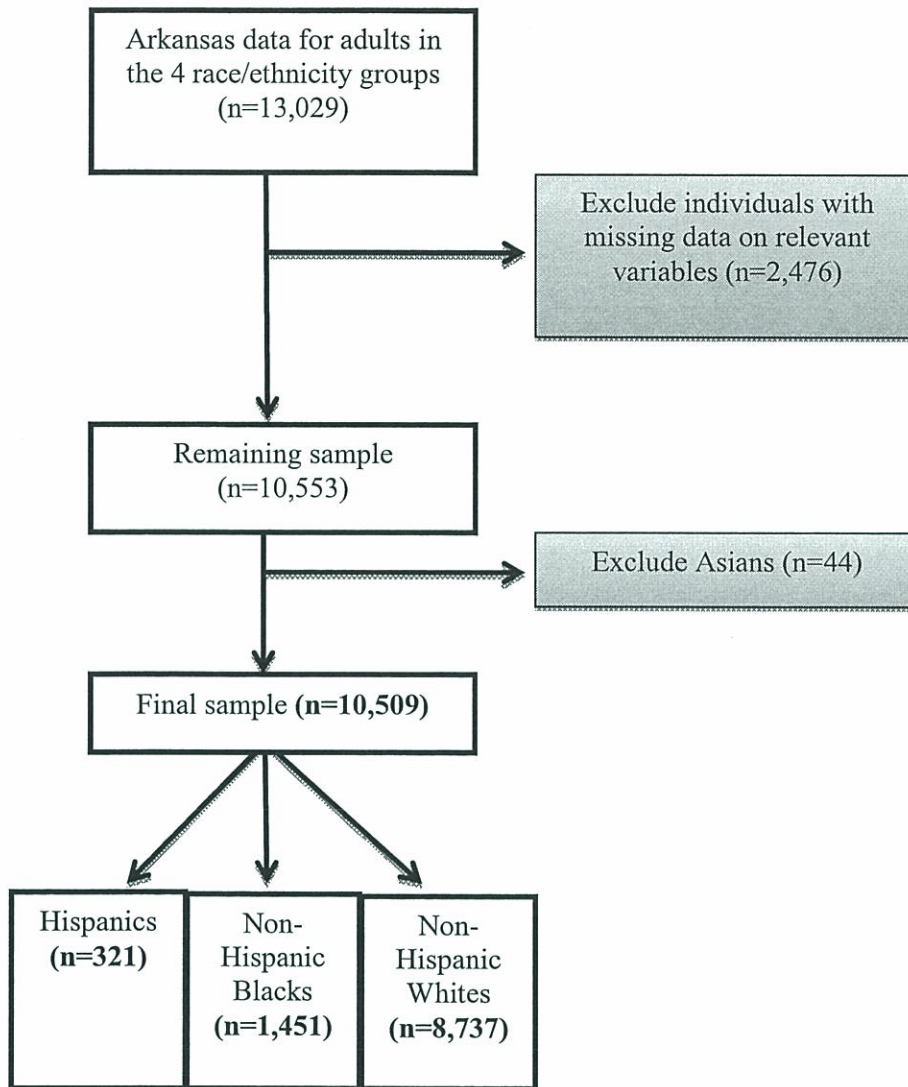The findings have clear implications for the state. Health inequalities generate costs to the state and successful efforts to reduce inequalities can be expected to generate benefits in the form of reductions in the direct and indirect costs of health inequalities. The challenge remains to find successful interventions that can be implemented in a cost-effective manner to achieve optimal health for all Arkansans.
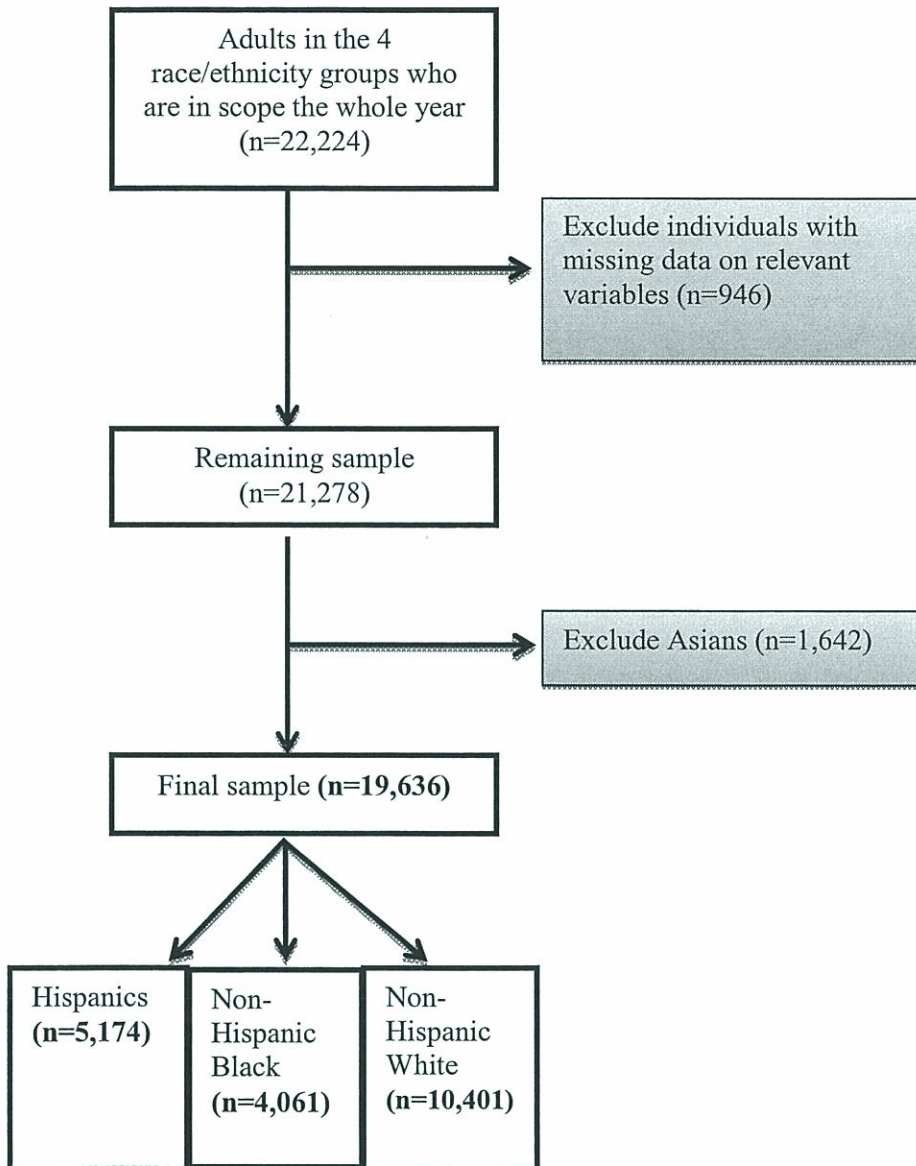
REFERENCES

(1) *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care.* Washington DC: Institute of Medicine, 2002.

(2) Trivedi AN, Zaslavsky AM, Schneider EC, Ayanian JZ. Relationship between quality of care and racial disparities in Medicare health plans. *JAMA* 2006;296:1998-2004.

(3) LaVeist L, Gaskin D, Richard P. The Economic Burden of Health Inequalities in the United States. 2009. Joint Center for Political and Economic Studies.

(4) Arthur M, Hedges JR, Newgard CD, Diggs BS, Mullins RJ. Racial disparities in mortality among adults hospitalized after injury. *Med Care* 2008;46:192-199.

(5) Gibbs BK, Nsiah-Jefferson L, McHugh MD, Trivedi AN, Prothrow-Stith D. Reducing racial and ethnic health disparities: exploring an outcome-oriented agenda for research and policy. *J Health Polit Policy Law* 2006;31:185-218.

(6) Manning WG, Mullahy J. Estimating log models: to transform or not to transform? *J Health Econ* 2001;20:461-494.

(7) Cook BL, Manning WG. Measuring racial/ethnic disparities across the distribution of health care expenditures. *Health Serv Res* 2009;44:1603-1621.

(8) Mullahy J. Much ado about two: reconsidering retransformation and the two-part model in health econometrics. *J Health Econ* 1998;17:247-281.

(9) Guy GP, Jr., Ekwueme DU, Yabroff KR et al. Economic burden of cancer survivorship among adults in the United States. *J Clin Oncol* 2013;31:3749-3757.

(10) Cutler DM. *Your Money or Your Life: Strong Medicine for America's Health Care System.* New York, New York: Oxford University Press, Inc., 2004.

APPENDICES

Appendix I. 2008-2010 BRFSS Sample Selection

Arkansas data for adults in the 4 race/ethnicity groups (n=13,029)

→ Exclude individuals with missing data on relevant variables (n=2,476)

Remaining sample (n=10,553)

→ Exclude Asians (n=44)

Final sample (n=10,509)

Hispanics (n=321)

Non-Hispanic Blacks (n=1,451)

Non-Hispanic Whites (n=8,737)

Appendix II. 2010 MEPS Sample Selection

```
┌─────────────────────────┐
│   Adults in the 4       │
│ race/ethnicity groups who│
│ are in scope the whole year│──────────────┐
│      (n=22,224)         │              │
└─────────────────────────┘              ▼
         │               ┌──────────────────────────┐
         │               │ Exclude individuals with │
         │─ ─ ─ ─ ─ ─ ─ ▶│ missing data on relevant │
         │               │ variables (n=946)        │
         │               └──────────────────────────┘
         ▼
┌─────────────────────────┐
│   Remaining sample      │
│      (n=21,278)         │
└─────────────────────────┘
         │               ┌──────────────────────────┐
         │─ ─ ─ ─ ─ ─ ─ ▶│ Exclude Asians (n=1,642) │
         │               └──────────────────────────┘
         ▼
┌─────────────────────────┐
│  Final sample (n=19,636)│
└─────────────────────────┘
```

Hispanics (n=5,174)	Non-Hispanic Black (n=4,061)	Non-Hispanic White (n=10,401)

For More Information Contact:

Fay W. Boozman College of Public Health

Department of Health Policy and

Management

4301 W. Markham, Slot 820

Little Rock, AR 72205

(501) 526-6633

TilfordMickJ@uams.edu