Health Disparities in U.S. Stroke Care and Beyond

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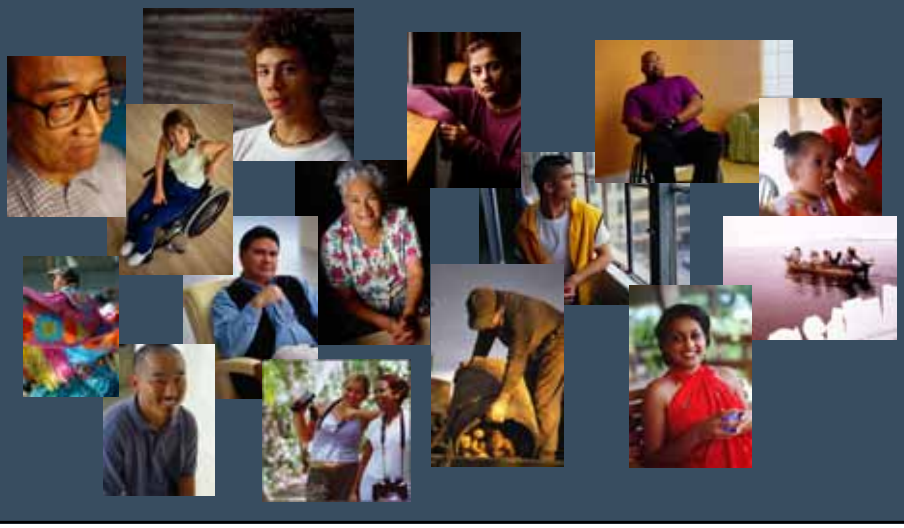
Medical Director, Comprehensive Stroke Center
Staff, Vascular Neurology
Cerebrovascular Center

Disclosures

- Consultant, Boston Scientific

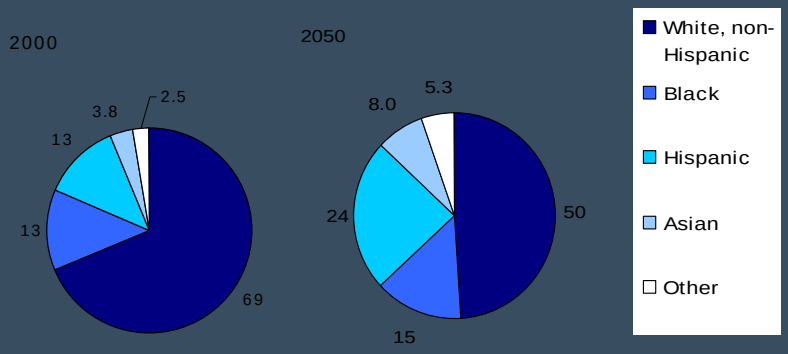
Health Disparities

Communities of Color are Disproportionately Affected



Minority groups will compose almost half of the U.S. population by 2050

Projected percentage change in racial/ethnic composition of the United States population, 2000 to 2050



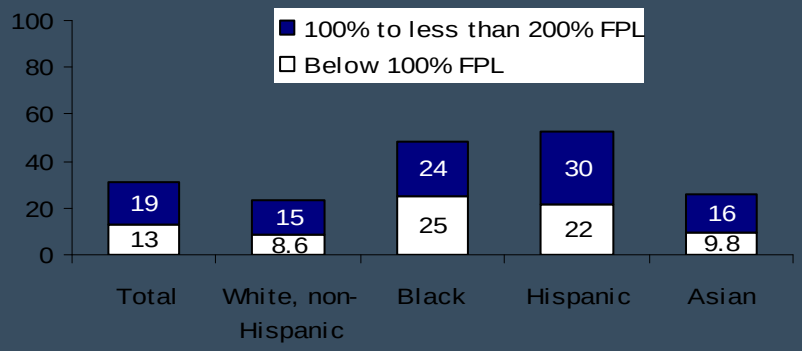
Note: Numbers add up to more than 100 percent because of rounding and because some categories are not mutually exclusive.

Note: "Other" includes the following categories: American Indian/Alaska Native, Native Hawaiian/other Pacific Islander, and two or more races.

Source: United States Census Bureau. U.S. Interim Projections by Age, Sex, Race and Hispanic Origin. 2004.

Blacks and Hispanics are twice as likely to live in poverty as whites and Asians.

Percentage of population by Federal Poverty Level, 2004

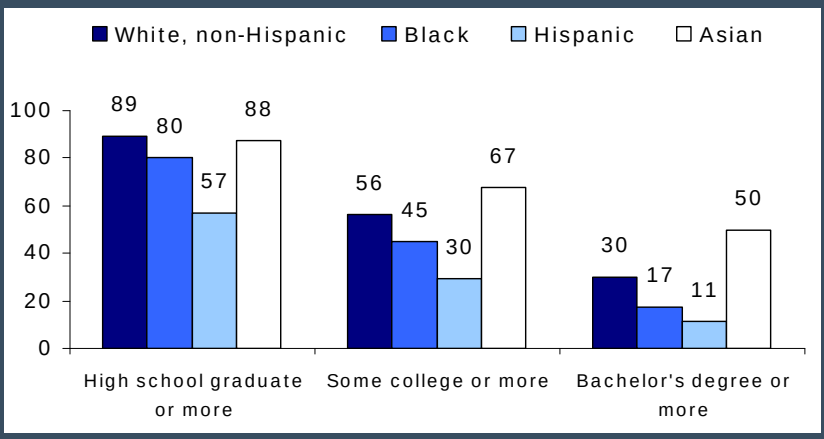


Federal Poverty Level (FPL) is based on family income and family size and composition. In 2004, FPL was $18,850 for a family of four. Source: Federal Register. 2004;69(30):7336–38.

Source: National Center for Health Statistics. *Health, United States, 2006: With Chartbook on Trends in the Health of Americans*. 2006.

Blacks and Hispanics have lower levels of educational attainment.

Percentage of population age 25 and older by education level achieved, 2003

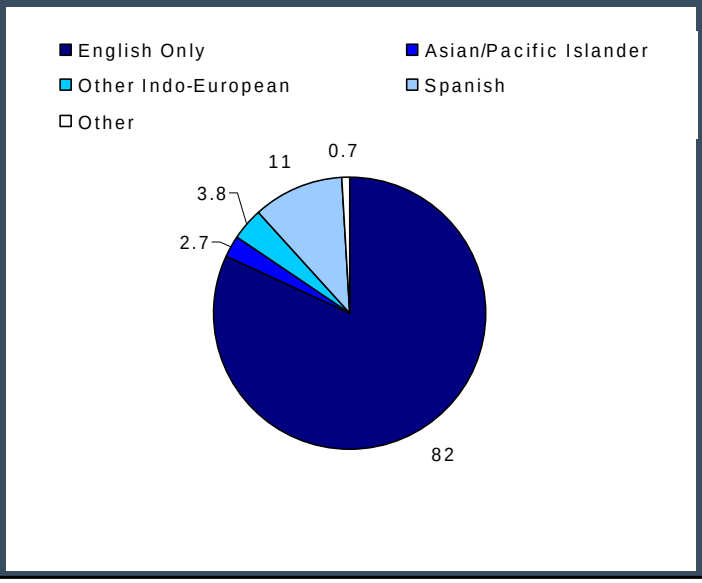


Note: "Some college" includes respondents who had completed some college but had not completed a degree and those who had completed an associate's degree.

Source: United States Census Bureau. Current Population Survey, Annual Social and Economic Supplement. 2003.

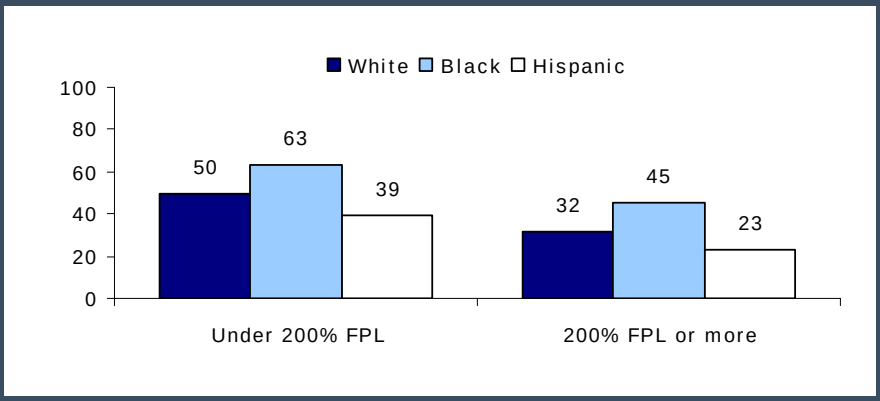
Nearly one-sixth of the U.S. population speaks a language other than English at home.

Percentage of population age 5 and older by language spoken at home, 2000



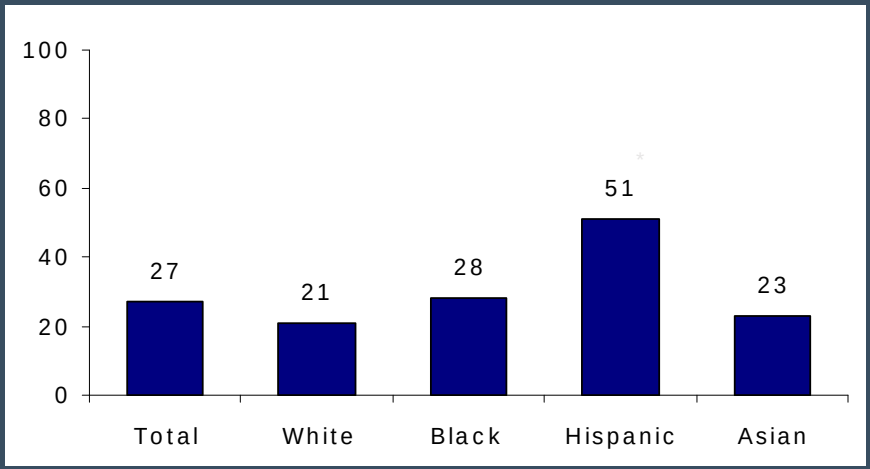
Even at higher incomes, blacks are more likely to suffer from a chronic condition or disability than whites and Hispanics.

Percentage of adults ages 19 to 64 with any chronic disease or disability, by poverty level, 2005



Almost 2.5 times as many Hispanics as whites report having no doctor.

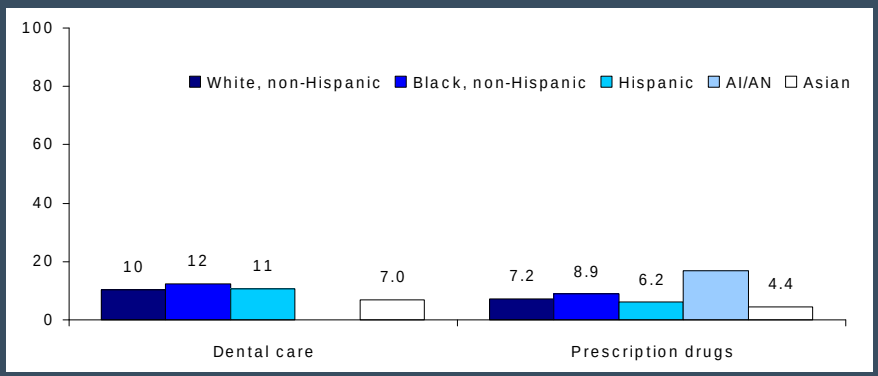
Percentage of adults ages 18 to 64 reporting no regular doctor, 2006



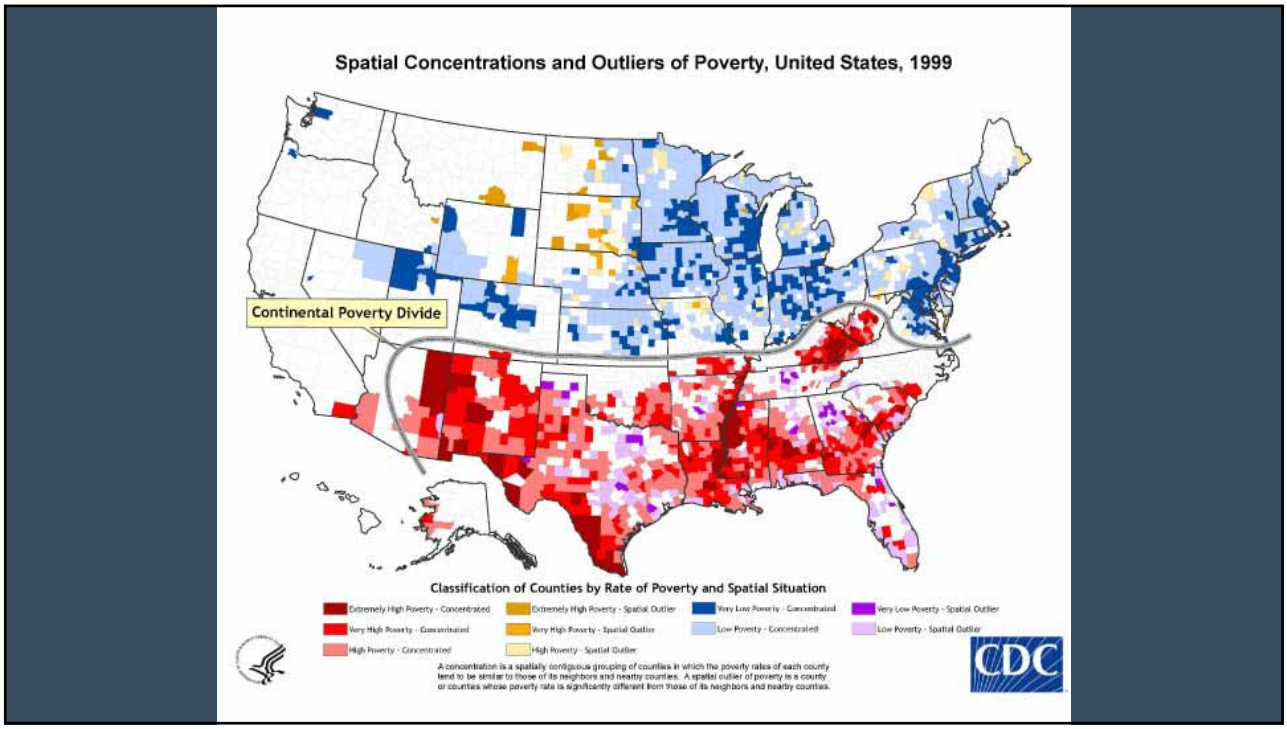
* Compared with whites, differences remain statistically significant after adjusting for age, income, and insurance.
Source: The Commonwealth Fund. Health Care Quality Survey. 2006.

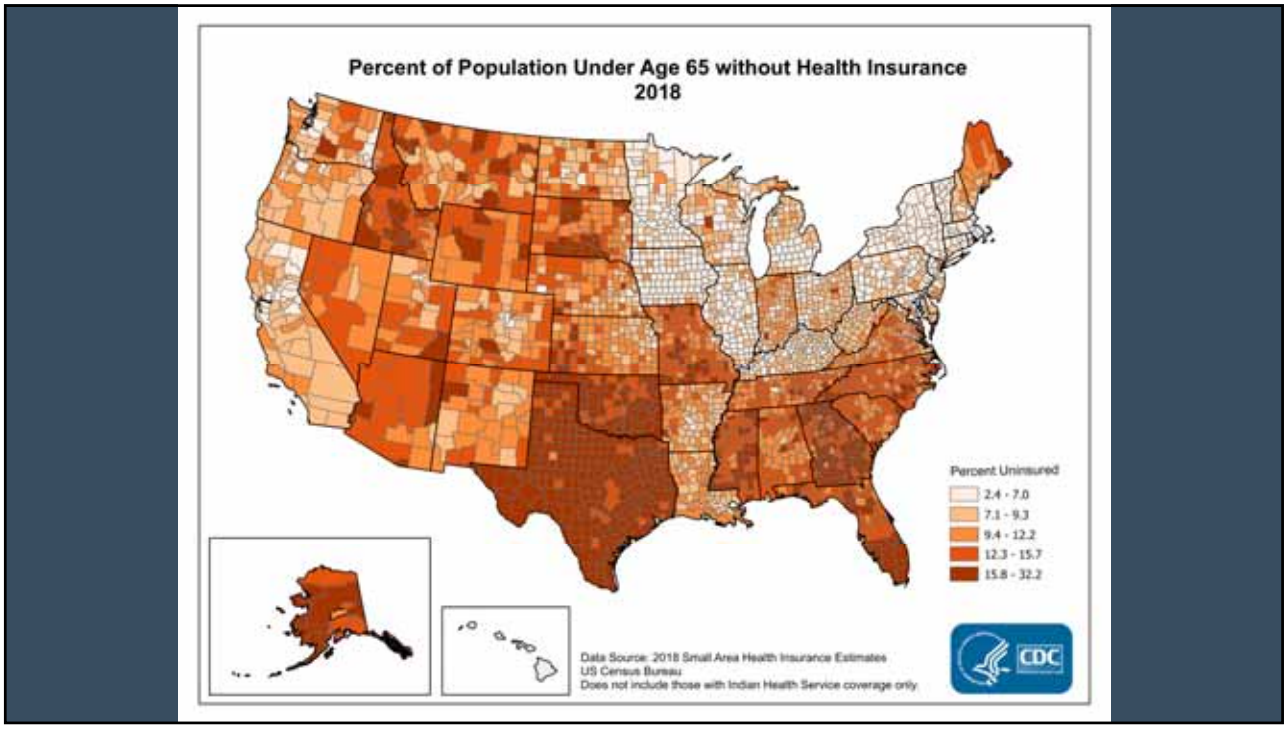
Blacks are more likely to forgo dental care and prescription drugs than whites; American Indians/Alaska Natives were most likely to go without prescription drugs.

Percentage of families in which a member was unable to receive or was delayed in receiving needed dental care or prescription drugs, 2003



Source: Agency for Healthcare Research and Quality. *National Healthcare Disparities Report.* 2006.


Spatial Concentrations and Outliers of Poverty, United States, 1999
Continental Poverty Divide
Classification of Counties by Rate of Poverty and Spatial Situation
Extremely High Poverty - Concentrated
Extremely High Poverty - Spatial Outlier
Very Low Poverty - Concentrated
Very Low Poverty - Spatial Outlier
Very High Poverty - Concentrated
Very High Poverty - Spatial Outlier
Low Poverty - Concentrated
Low Poverty - Spatial Outlier
High Poverty - Concentrated
High Poverty - Spatial Outlier
A concentration is a spatially contiguous grouping of counties in which the poverty rates of each county tend to be similar to those of its neighbors and nearby counties. A spatial outlier of poverty is a county or counties whose poverty rate is significantly different from those of its neighbors and nearby counties.
CDC

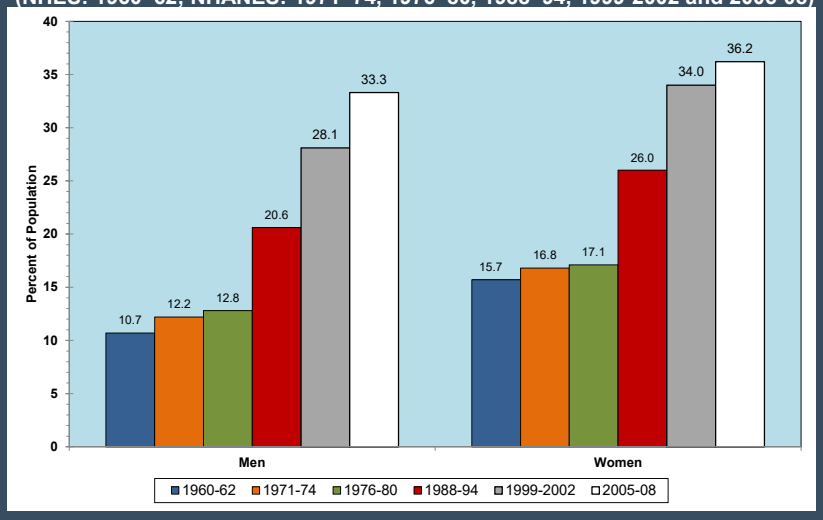

Percent of Population Under Age 65 without Health Insurance
2018
Percent Uninsured
2.4 - 7.0
7.1 - 9.3
9.4 - 12.2
12.3 - 15.7
15.8 - 32.2
Data Source: 2018 Small Area Health Insurance Estimates
US Census Bureau
Does not include those with Indian Health Service coverage only.
CDC

Major Stroke Risk Factors

- Hypertension (BP ≥140/90 mmHg or on antihypertensive medication)
- Cigarette smoking (passive smoking?)
- Elevated total or LDL-cholesterol
- Obesity
- Physical inactivity: most experts recommend at least 30 minutes moderate activity at least 4-5 days/week
- Atrial Fibrillation
- Extracranial and intracranial atherosclerosis

Age-adjusted prevalence of obesity in adults 20–74 years of age, by sex and survey year

(NHES: 1960–62; NHANES: 1971–74, 1976–80, 1988–94, 1999-2002 and 2005-08)

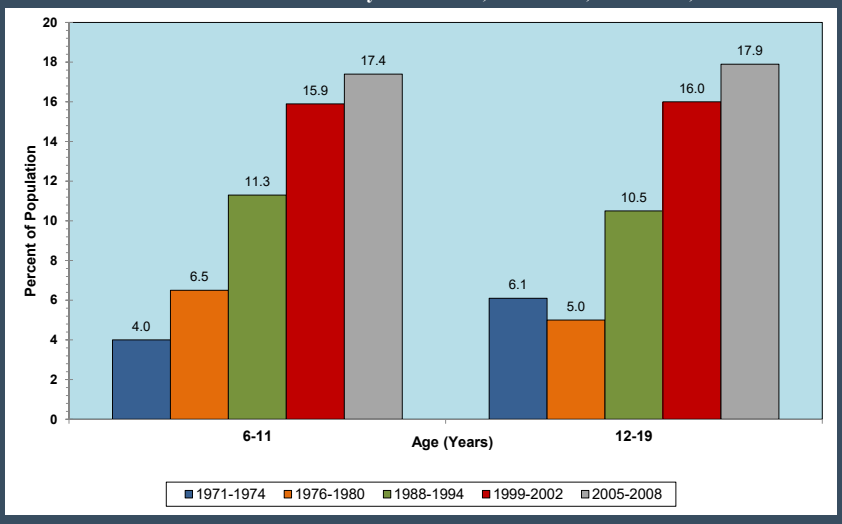


Data derived from *Health, United States, 2010: With Special Feature on Death and Dying.* NCHS, 2011.

Roger VL et al. Published online in *Circulation* Dec. 15, 2011

Trends in the prevalence of obesity among US children and adolescents by age and survey year

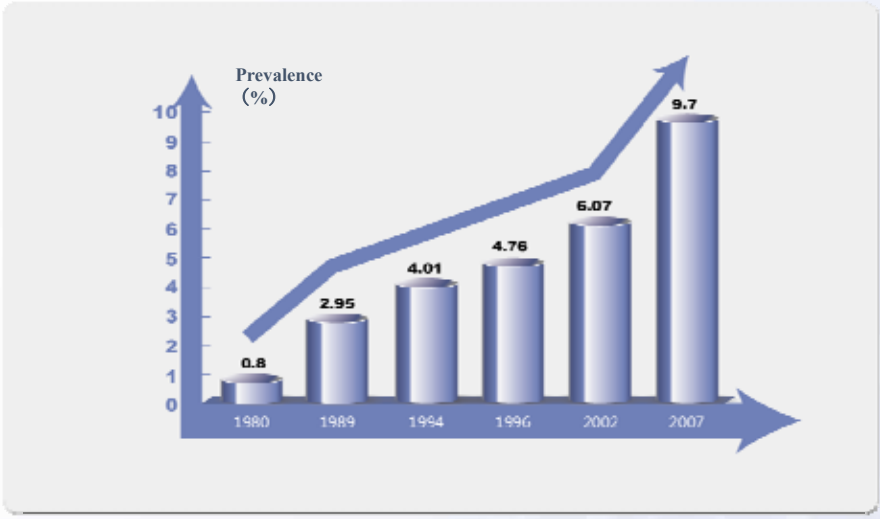
(National Health and Nutrition Examination Survey: 1971-1974, 1976-1980, 1988-1994, 1999-2002 and 2005–2008)



Data derived from *Health, United States, 2010: With Special Feature on Death and Dying.* NCHS, 2011.

Roger VL et al. Published online in *Circulation* Dec. 15, 2011

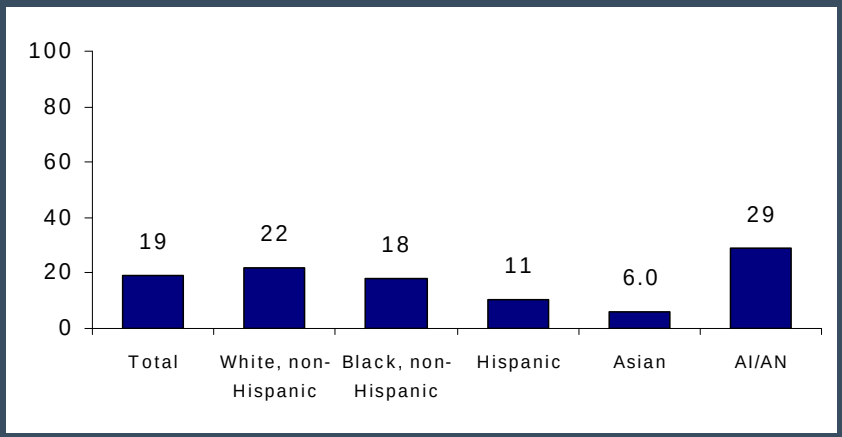
Increasing prevalence of diabetes in urban China



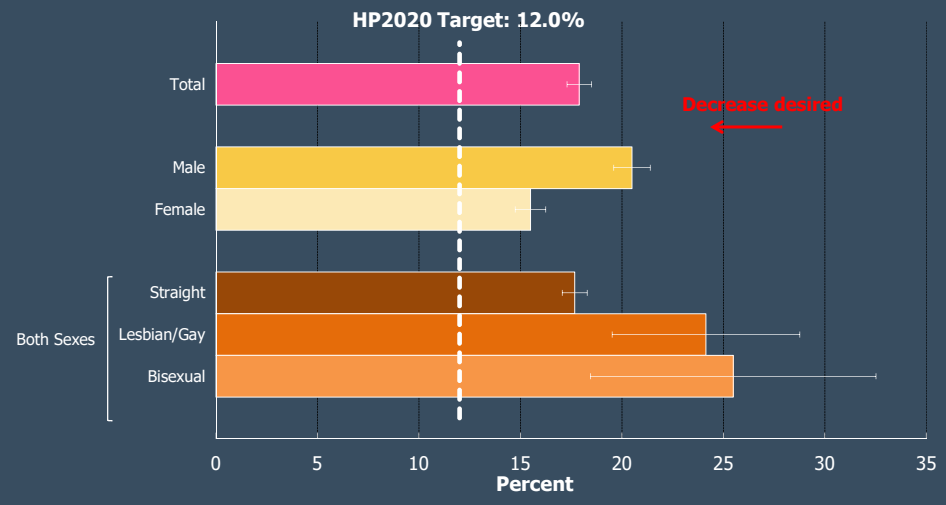
Ministry of Health of the People's Republic of China

American Indians/Alaska Natives are more likely to smoke than whites; blacks, Hispanics, and Asians are less likely to smoke.

Percentage of adults age 18 and overwho are current smokers, 2002–2004



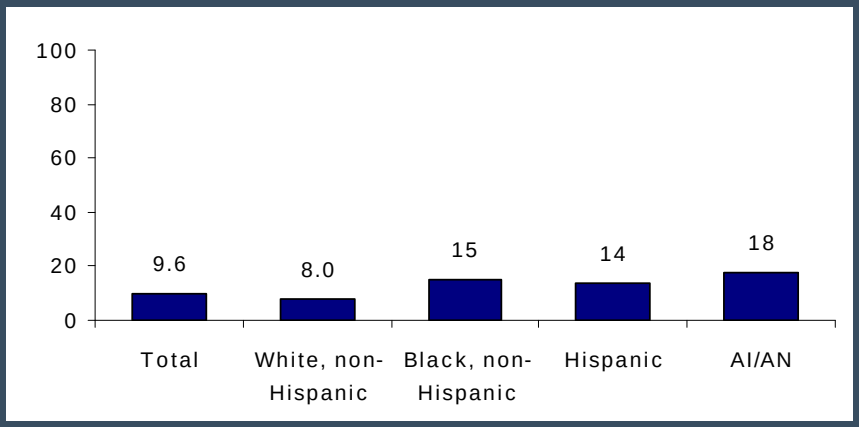
Current Cigarette Smoking, Adults Ages 18 Years and Over, 2013



SOURCE: National Health Interview Survey (NHIS), CDC/NCHS

American Indians/Alaska Natives are more likely to have diabetes than other groups

Percentage of people age 20 years or older with diabetes, 2005

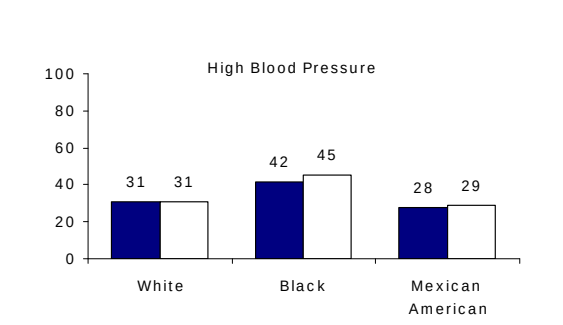


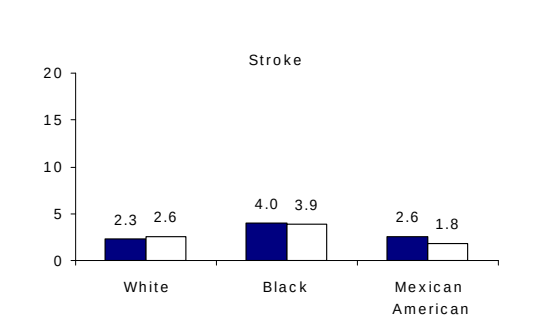
AI/AN = American Indian/Alaska Native.

Source: National Institutes of Health, National Diabetes Information Clearinghouse. *Total Prevalence of Diabetes Among People Aged 20 Years or Older, United States, 2005.*

Black men and women are most likely to have high blood pressure, and stroke

Percentage of people age 20 or older, 2003





Note: Data were only available for the largest Hispanic subpopulation, Mexican Americans.
Note: Data are age adjusted for Americans age 20 and older.
Source: T. Thom et al., "Heart Disease and Stroke Statistics—2006 Update," *Circulation,* Feb. 14, 2006 113(6):e85–e151.

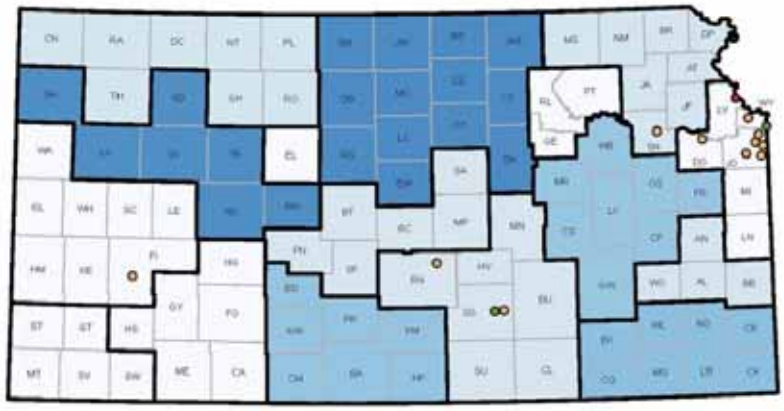
Adverse Work Conditions and Job Loss

- 21902 Japanese males and 19826 females were followed up for 19 years
- Job loss was associated with a >50% increase in incident stroke and a >2-fold increase in stroke mortality

Eshak ES, et al. *Stroke* 2017;48:1176–1182.

Looking for Gaps: Adult Hypertension Burden and Certified Stroke Care Facilities, Kansas

Fifteen hospitals in Kansas are certified by the Joint Commission for providing quality care to stroke patients. The certifications are offered in collaboration with the American Heart Association/American Stroke Association. The northcentral and northwest regions of the state have the highest prevalence of hypertension in adults but lack certified stroke centers.



0 25 50 100 Miles

Source: 2017 Kansas Behavioral Risk Factor Surveillance System; Certified Stroke Care Facility data downloaded from National Stroke Association website-the Joint Commission database: https://www.stroke.org/understand-stroke/recognizing-stroke/emergency-stroke-center-locations/. (Accessed 7/11/19). Date: July 17, 2019 Created by: Mengyi Li, MPH, Silvia Gulick, MHSA, Belle Federman, ScD

Prevalence (%) of Hypertension among Adults Aged 18 Years and Older, 2017 (Public Health Preparedness Region)

- 21.3% - 29.8%
- 29.9% - 35.6%
- 35.7% - 40.5%
- 40.6% - 41.7%

Public Health Preparedness Region

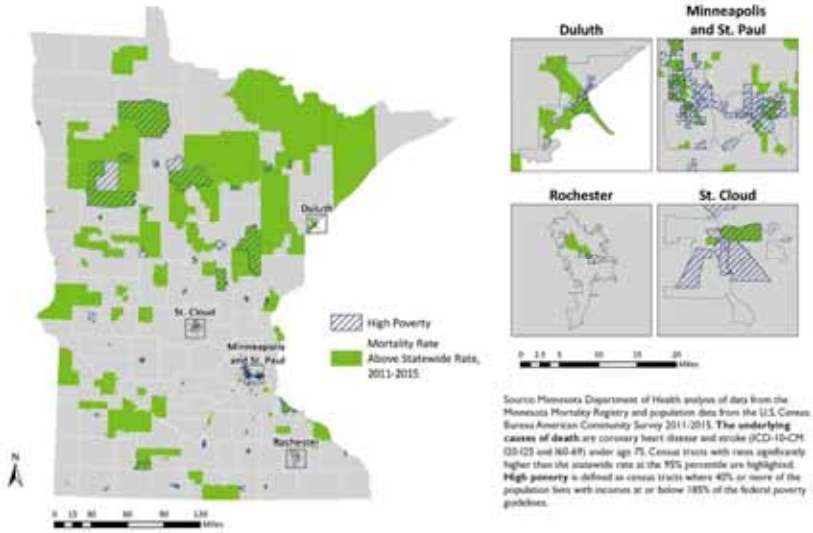
Type of Certified Stroke Centers*

- Acute Stroke Ready Hospital (ASRH) (n = 1)
- Primary Stroke Center (PSC) (n = 1 1)
- Comprehensive Stroke Center (CSC) (n = 2)

*ASRH: hospitals or emergency centers with a dedicated stroke-focused program
PSC: hospitals providing the critical elements to achieve long-term success in improving outcomes
CSC: hospitals that have specific abilities to receive and treat the most complex stroke cases

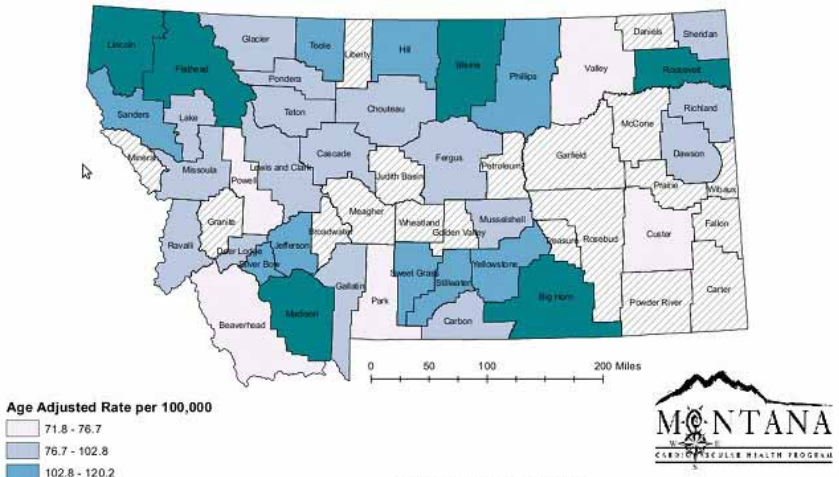
Kansas Department of Health and Environment

High Poverty and High Heart Disease and Stroke Mortality Rates Under Age 75



Source: Minnesota Department of Health analysis of data from the Minnesota Mortality Registry and population data from the U.S. Census Bureau American Community Survey 2011-2015. **The underlying causes of death** are coronary heart disease and stroke (ICD-10-CM: I20-I25 and I60-I69) under age 75. Census tracts with rates significantly higher than the statewide rate at the 95% percentile are highlighted. **High poverty** is defined as census tracts where 40% or more of the population lives with incomes at or below 185% of the federal poverty guidelines.

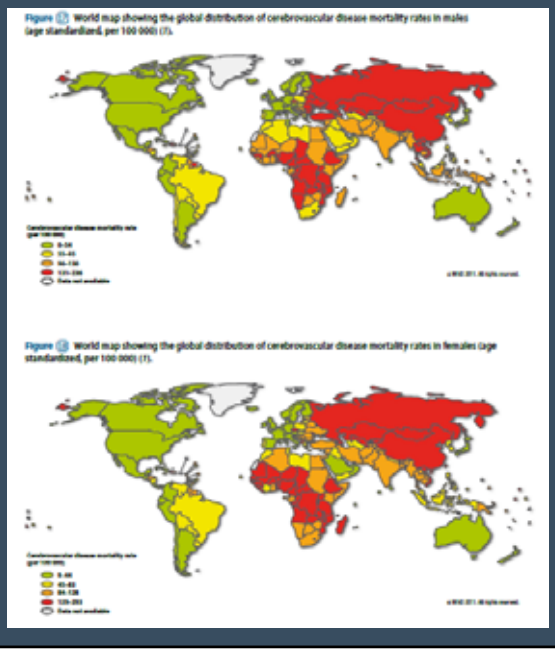
Age-adjusted cerebrovascular disease rates per 100,000 people 35 years and older, by county 2000-2006



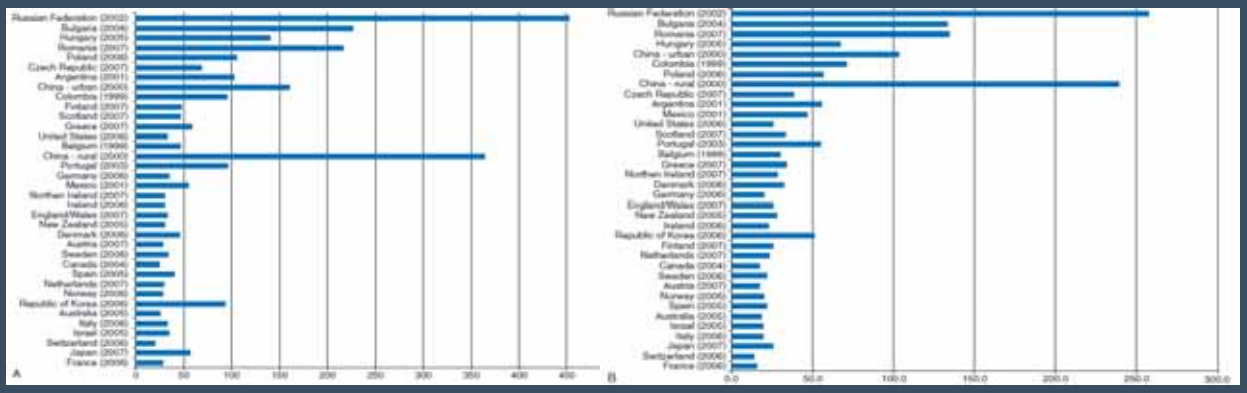
Stroke defined by ICD-10 codes I60-I69

Suggested Citation: Centers for Disease Control and Prevention, National Center for Health Statistics. Compressed Mortality File 1999-2006. CDC WONDER On-line Database, compiled from Compressed Mortality File 1999-2006 Series 20 No. 2L, 2009. Accessed at http://wonder.cdc.gov/cmf-icd10.html on Apr 30, 2010 9:59:52 AM

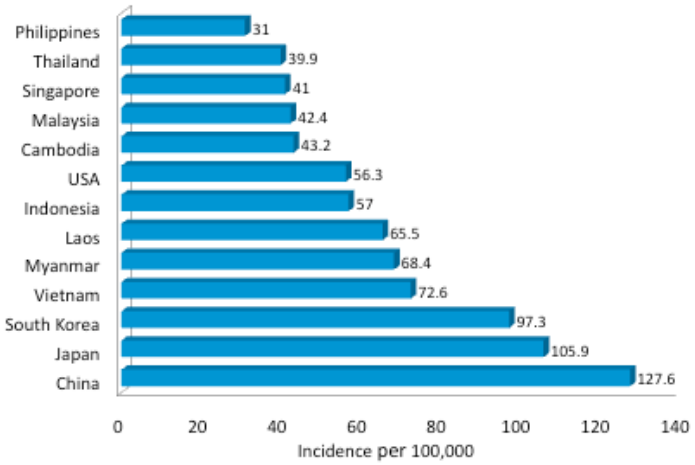
Worldwide Mortality from Cerebrovascular Disease 2011



Age-Adjusted Death Rates from Stroke, by Country



Incidence of Stroke in the Asian Pacific Region (2002)

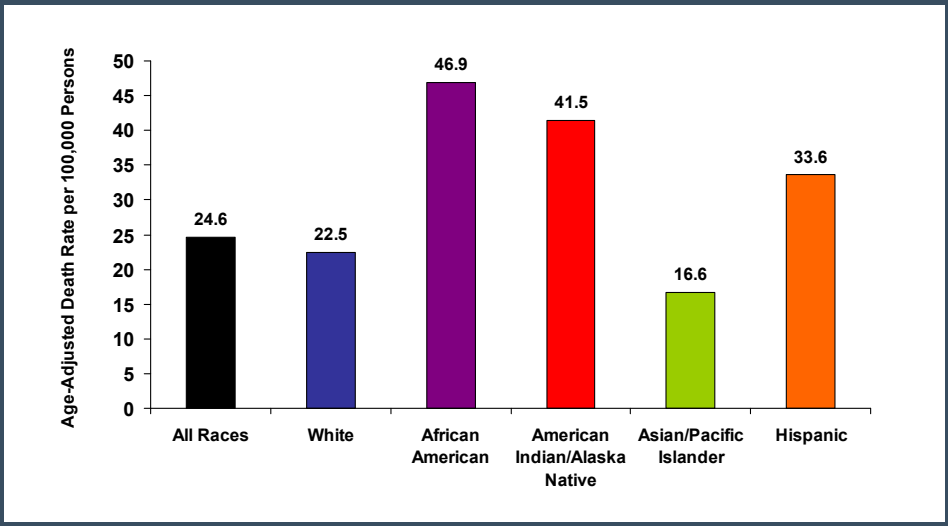


MacKay J, Mensah G. *Atlas of Heart Disease and Stroke*. 2004. Geneva, Switzerland: WHO; 2004. WHO Figures (not adjusted for age).

Medscape

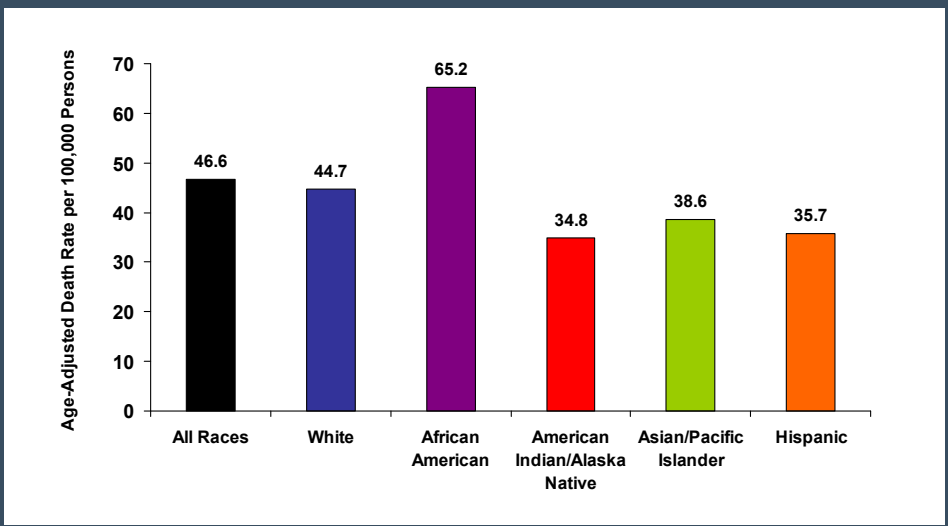
Diabetes

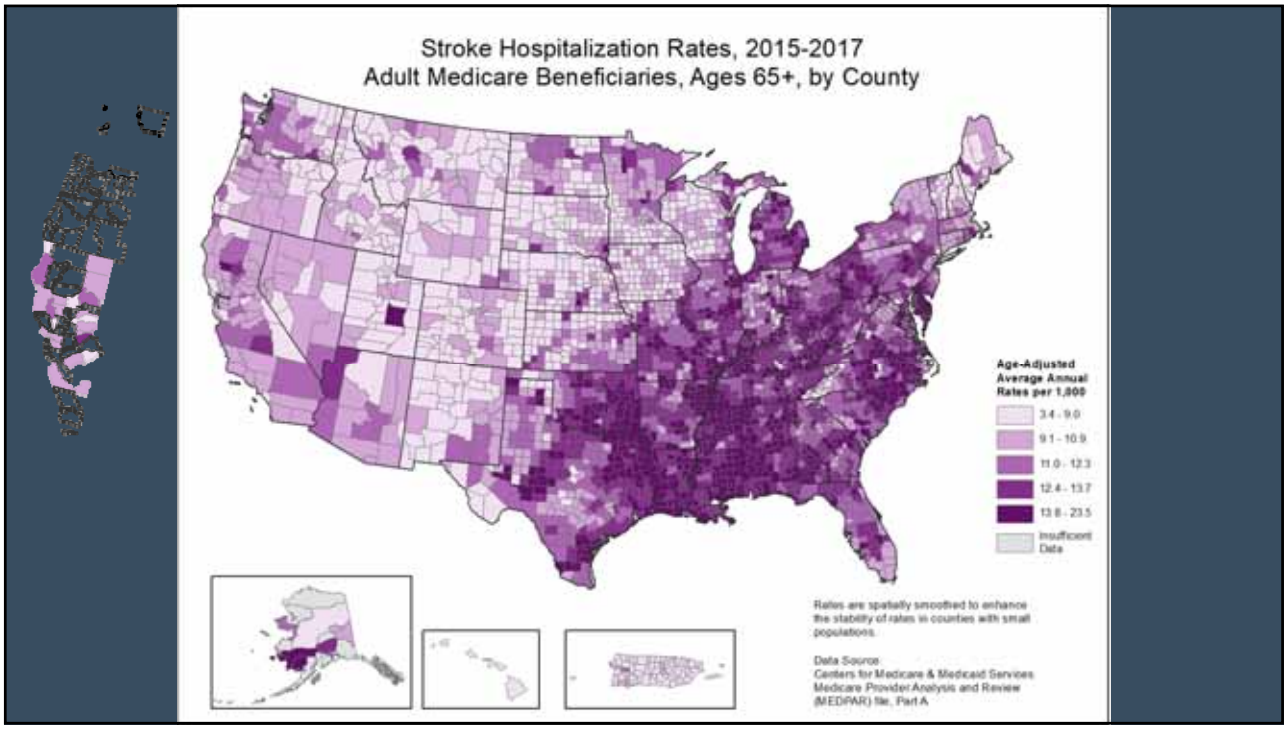
Age-Adjusted Death Rates per 100,000 Persons by Race & Hispanic Origin: U.S., 2005

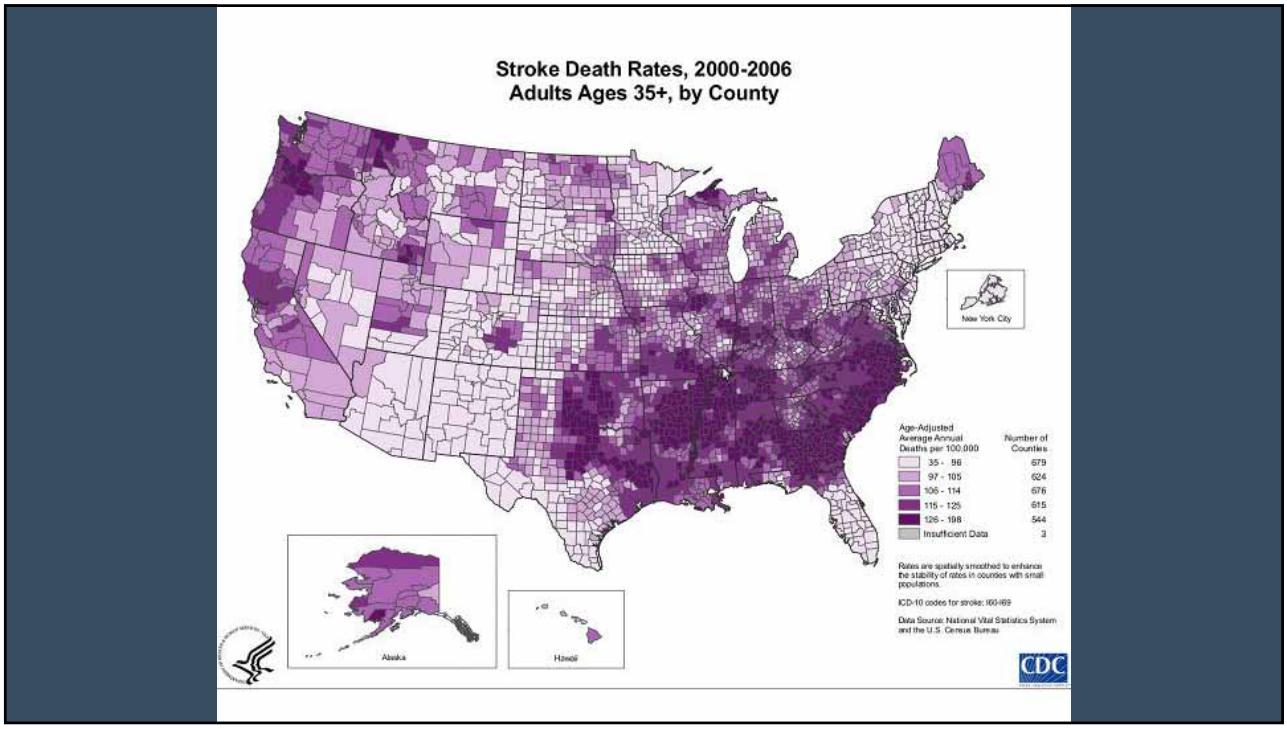


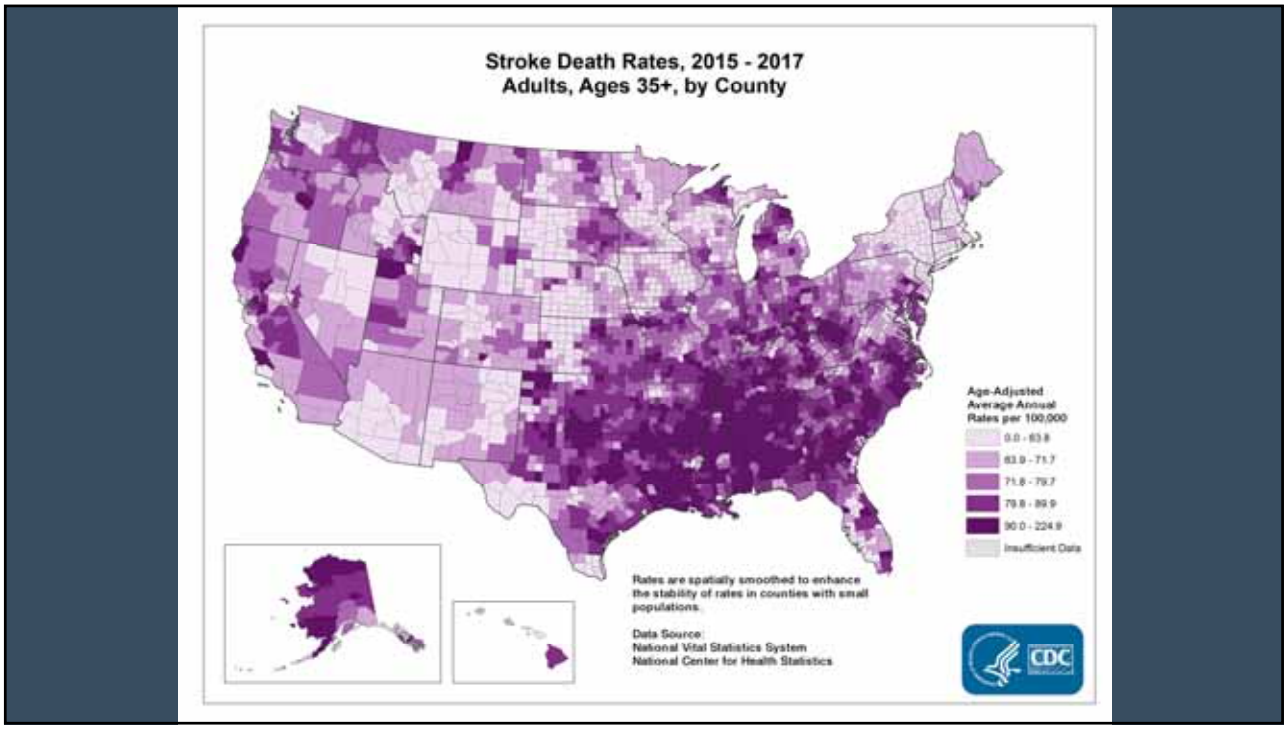
Stroke

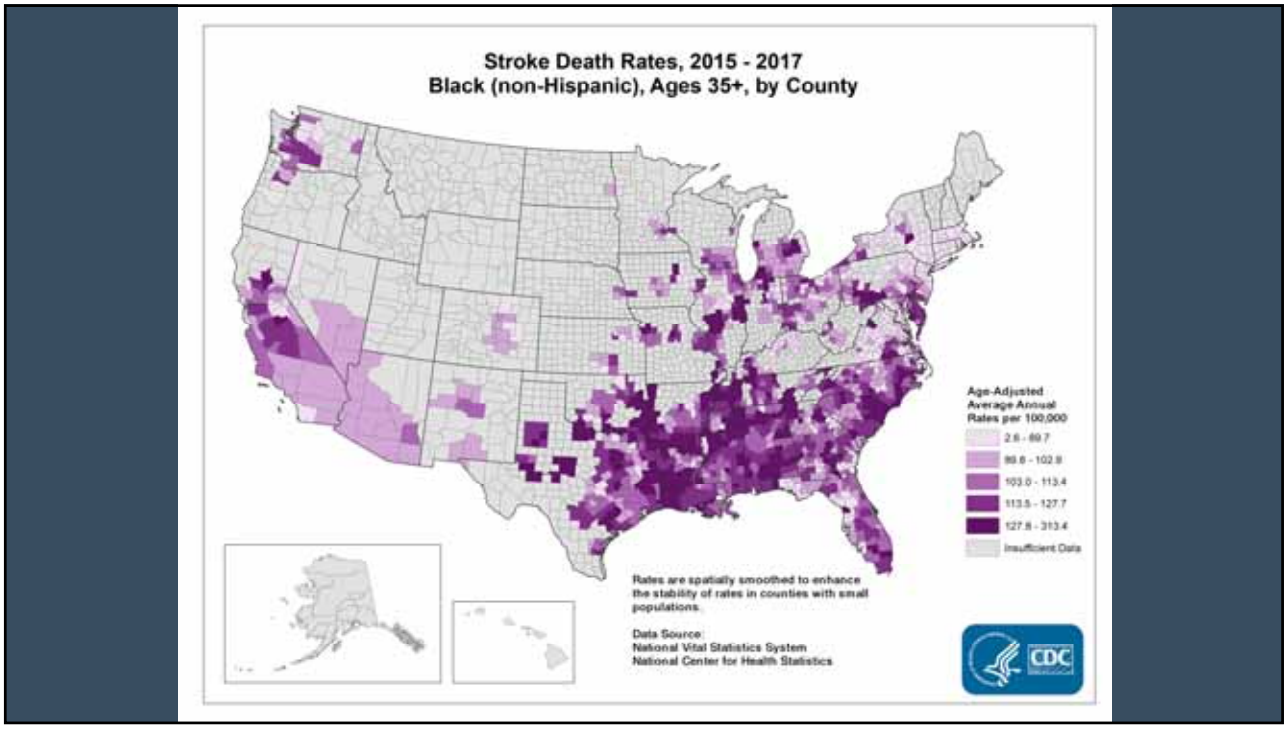
Age-Adjusted Death Rates per 100,000 Persons by Race & Hispanic Origin: U.S., 2005

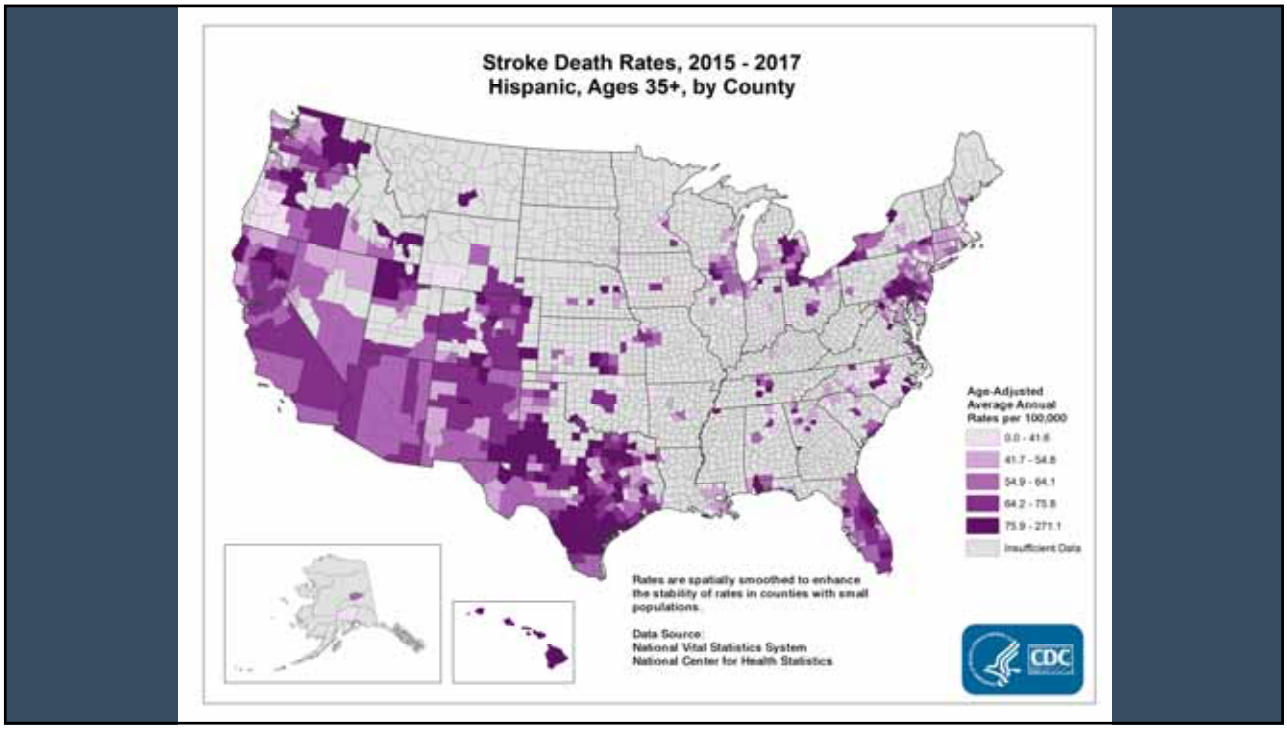


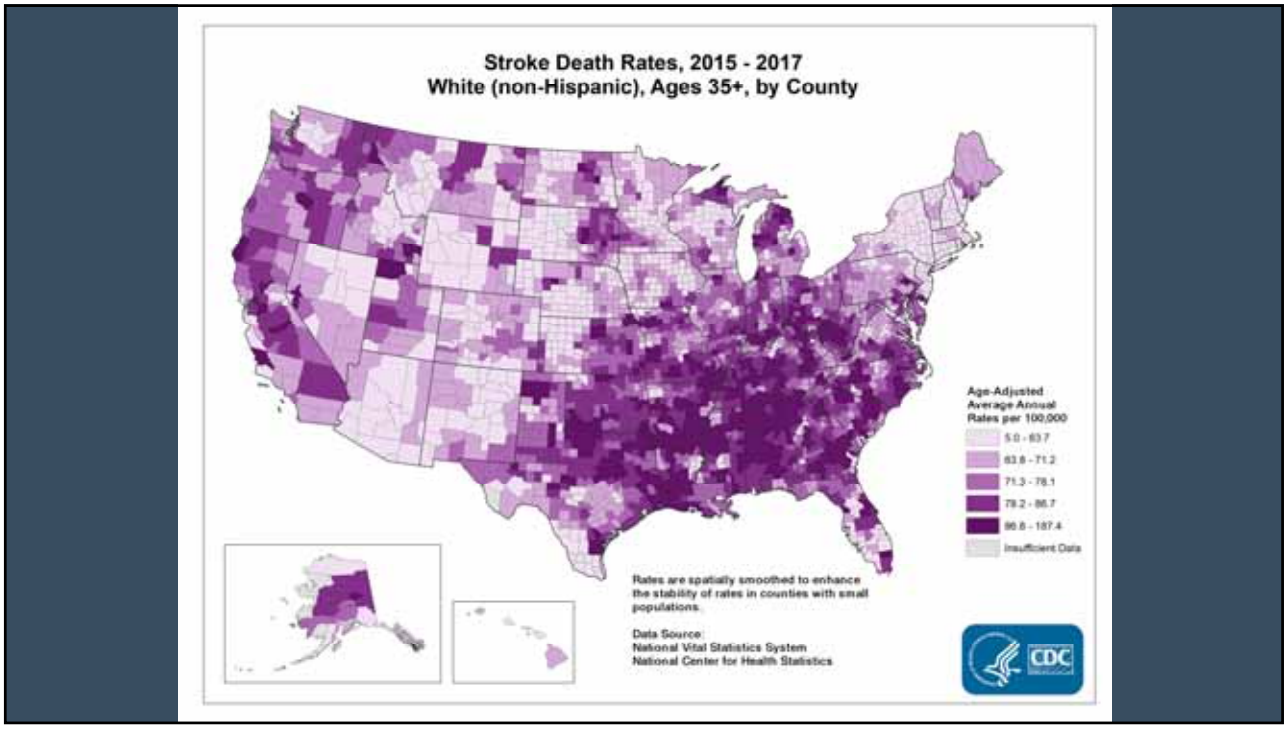

Stroke Hospitalization Rates, 2015-2017
Adult Medicare Beneficiaries, Ages 65+, by County
Age-Adjusted Average Annual Rates per 1,000
3.4 - 9.0
9.1 - 10.9
11.0 - 12.3
12.4 - 13.7
13.8 - 23.5
Insufficient Data
Rates are spatially smoothed to enhance the stability of rates in counties with small populations.
Data Source
Centers for Medicare & Medicaid Services
Medicare Provider Analysis and Review (MEDPAR) file, Part A

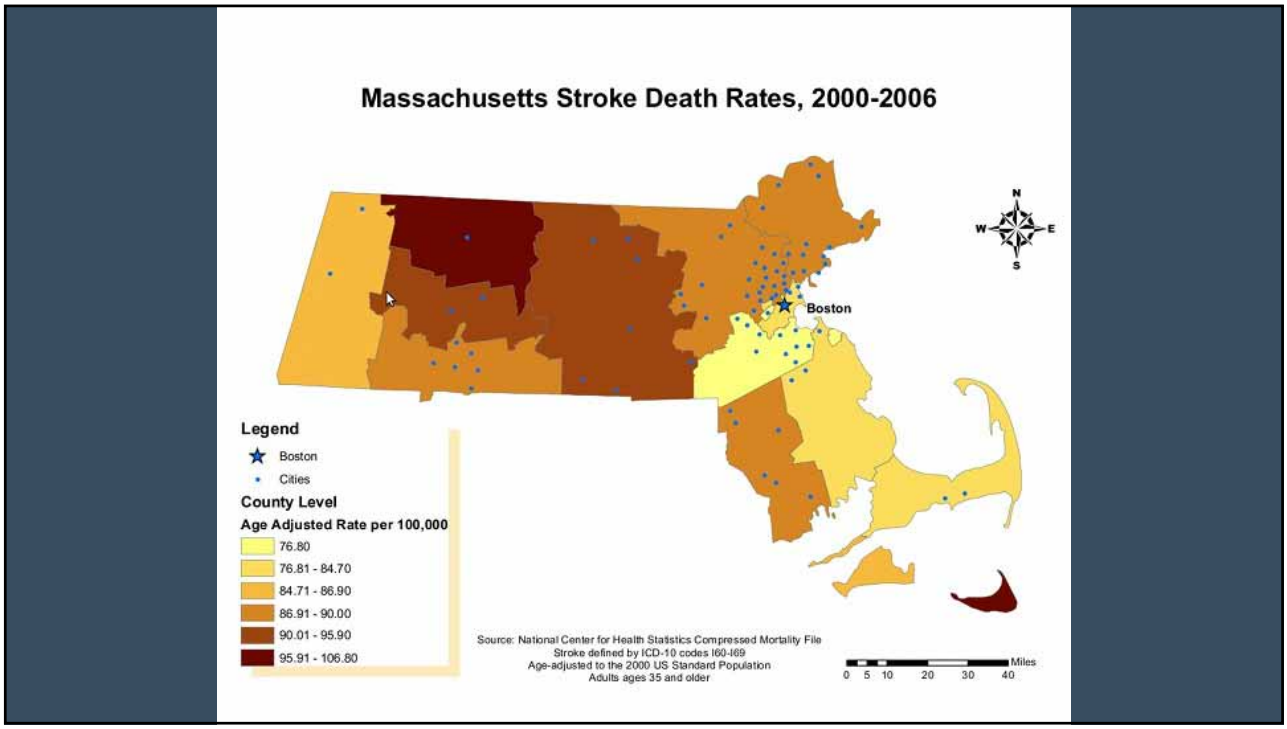

Stroke Death Rates, 2000-2006
Adults Ages 35+, by County
New York City
Age-Adjusted Average Annual Deaths per 100,000
Number of Counties
35 - 96 679
97 - 105 624
106 - 114 676
115 - 125 615
126 - 198 544
Insufficient Data 3
Rates are spatially smoothed to enhance the stability of rates in counties with small populations.
ICD-10 codes for stroke: I60-I69
Data Source: National Vital Statistics System and the U.S. Census Bureau
Alaska
Hawaii
CDC

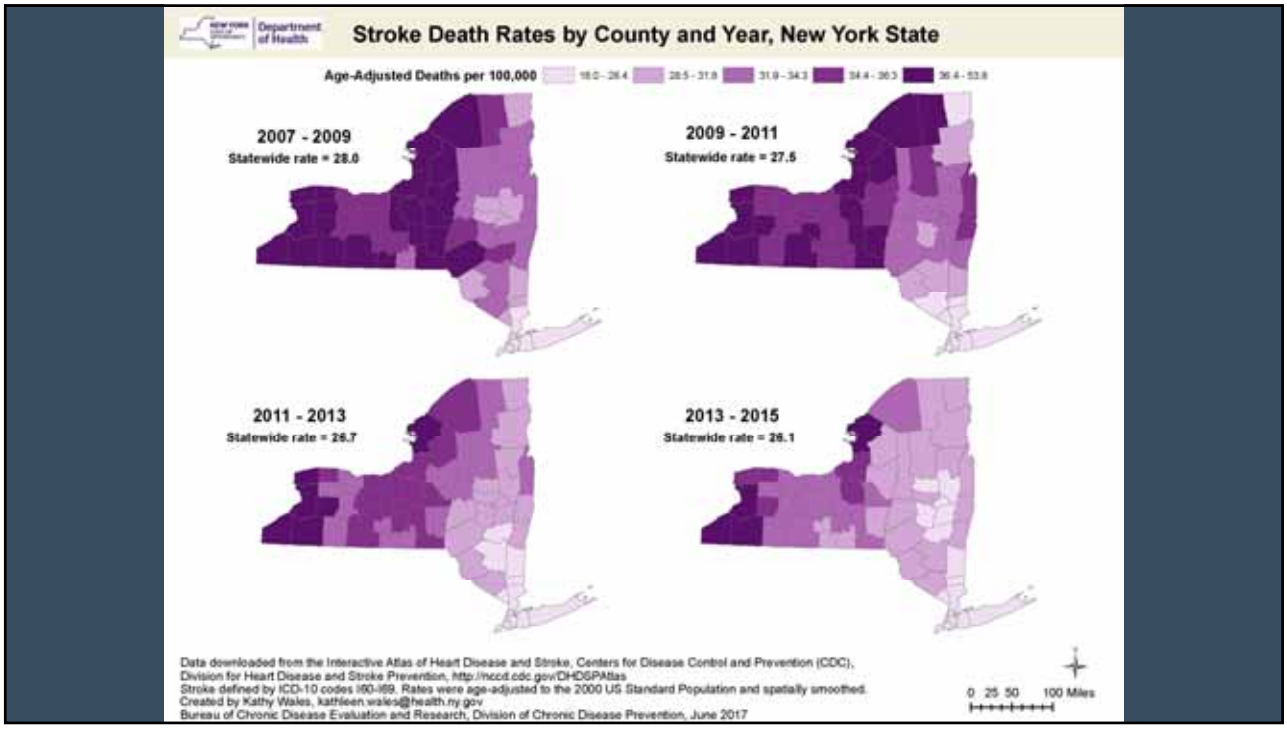

Stroke Death Rates, 2015 - 2017
Adults, Ages 35+, by County
Age-Adjusted
Average Annual
Rates per 100,000
0.0 - 63.8
63.9 - 71.7
71.8 - 79.7
79.8 - 89.9
90.0 - 224.9
Insufficient Data
Rates are spatially smoothed to enhance the stability of rates in counties with small populations.
Data Source:
National Vital Statistics System
National Center for Health Statistics
CDC

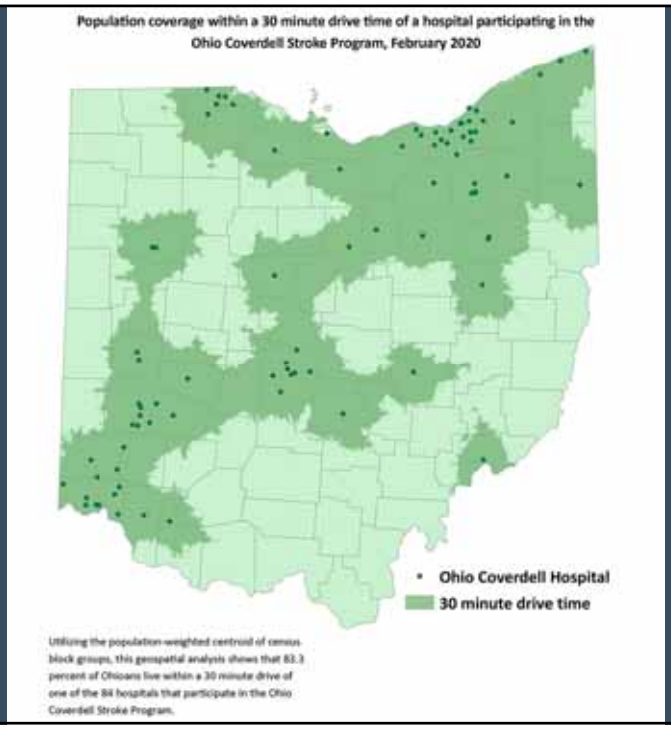

Stroke Death Rates, 2015 - 2017
Black (non-Hispanic), Ages 35+, by County
Age-Adjusted
Average Annual
Rates per 100,000
2.6 - 69.7
69.8 - 102.9
103.0 - 113.4
113.5 - 127.7
127.8 - 313.4
Insufficient Data
Rates are spatially smoothed to enhance the stability of rates in counties with small populations.
Data Source:
National Vital Statistics System
National Center for Health Statistics
CDC

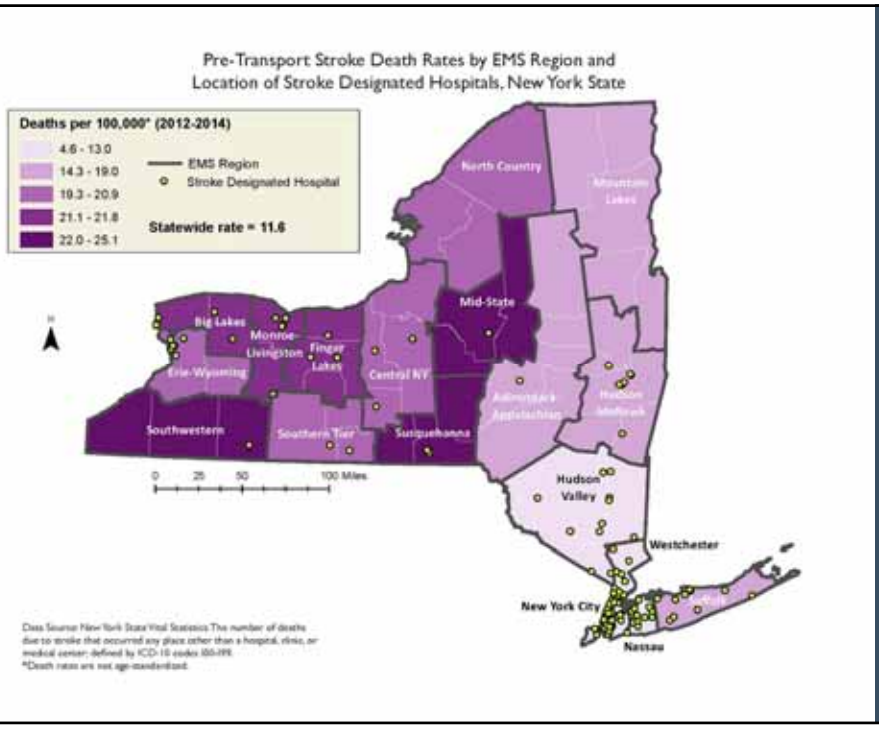

Stroke Death Rates, 2015 - 2017
Hispanic, Ages 35+, by County
Age-Adjusted
Average Annual
Rates per 100,000
0.0 - 41.6
41.7 - 54.8
54.9 - 64.1
64.2 - 75.8
75.9 - 271.1
Insufficient Data
Rates are spatially smoothed to enhance the stability of rates in counties with small populations.
Data Source:
National Vital Statistics System
National Center for Health Statistics
CDC


Stroke Death Rates, 2015 - 2017
White (non-Hispanic), Ages 35+, by County
Age-Adjusted
Average Annual
Rates per 100,000
5.0 - 63.7
63.8 - 71.2
71.3 - 78.1
78.2 - 86.7
86.8 - 187.4
Insufficient Data
Rates are spatially smoothed to enhance the stability of rates in counties with small populations.
Data Source:
National Vital Statistics System
National Center for Health Statistics
CDC

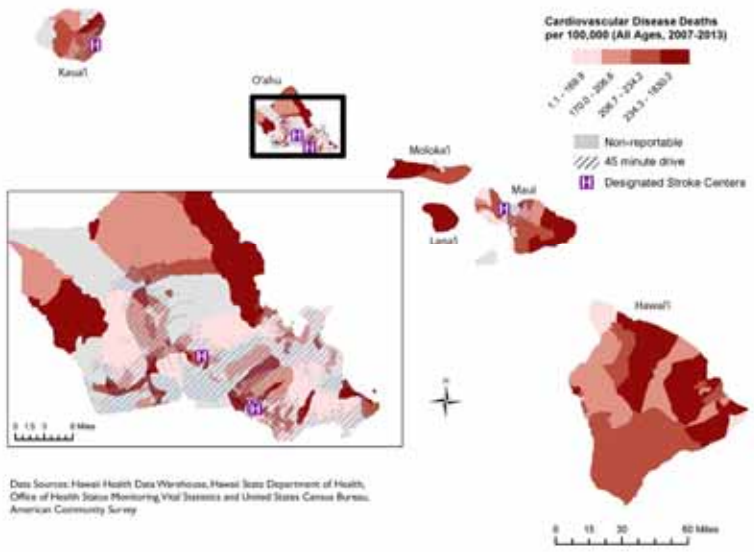

Massachusetts Stroke Death Rates, 2000-2006
Boston
N
W
E
S
Legend
Boston
Cities
County Level
Age Adjusted Rate per 100,000
76.80
76.81 - 84.70
84.71 - 86.90
86.91 - 90.00
90.01 - 95.90
95.91 - 106.80
Source: National Center for Health Statistics Compressed Mortality File
Stroke defined by ICD-10 codes I60-I69
Age-adjusted to the 2000 US Standard Population
Adults ages 35 and older
Miles
0 5 10 20 30 40


Department of Health
Stroke Death Rates by County and Year, New York State
Age-Adjusted Deaths per 100,000
2007 - 2009
Statewide rate = 28.0
2009 - 2011
Statewide rate = 27.5
2011 - 2013
Statewide rate = 26.7
2013 - 2015
Statewide rate = 26.1
Data downloaded from the Interactive Atlas of Heart Disease and Stroke, Centers for Disease Control and Prevention (CDC),
Division for Heart Disease and Stroke Prevention, http://nccd.cdc.gov/DHDSPAtlas
Stroke defined by ICD-10 codes I60-I69. Rates were age-adjusted to the 2000 US Standard Population and spatially smoothed.
Created by Kathy Wales, kathleen.wales@health.ny.gov
Bureau of Chronic Disease Evaluation and Research, Division of Chronic Disease Prevention, June 2017
0 25 50 100 Miles


Population coverage within a 30 minute drive time of a hospital participating in the Ohio Coverdell Stroke Program, February 2020
Ohio Coverdell Hospital
30 minute drive time
Utilizing the population-weighted centroid of census block groups, this geospatial analysis shows that 83.3 percent of Ohioans live within a 30 minute drive of one of the 84 hospitals that participate in the Ohio Coverdell Stroke Program.

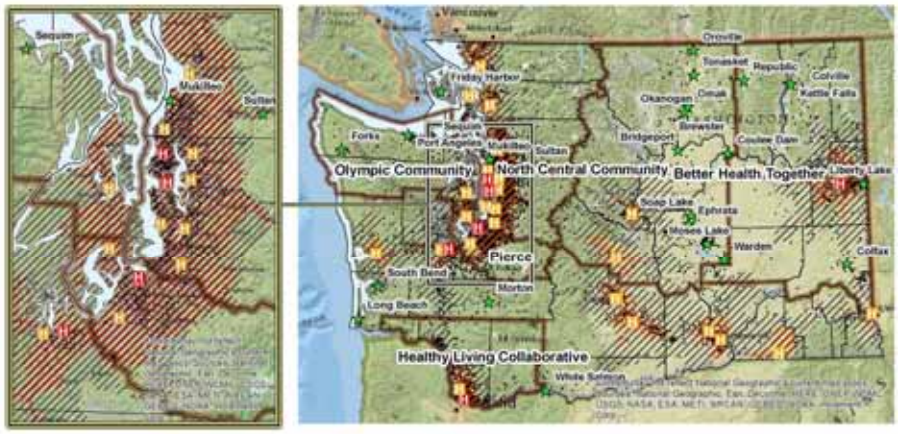

Pre-Transport Stroke Death Rates by EMS Region and Location of Stroke Designated Hospitals, New York State
Deaths per 100,000* (2012-2014)
4.6 - 13.0
14.3 - 19.0
19.3 - 20.9
21.1 - 21.8
22.0 - 25.1
EMS Region
Stroke Designated Hospital
Statewide rate = 11.6
North Country
Mountain Lakes
Mid-State
Big Lakes
Monroe-Livingston
Finger Lakes
Erie-Wyoming
Central NY
Adirondack Appalachian
Hudson Mohawk
Southwestern
Southern Tier
Susquehanna
0 25 50 100 Miles
Hudson Valley
Westchester
New York City
Nassau
Data Source: New York State Vital Statistics. The number of deaths due to stroke that occurred any place other than a hospital, clinic, or medical center; defined by ICD-10 codes I60-I69.
*Death rates are not age-standardized.

Cardiovascular Disease Mortality Rates and 45-minute Drive Times to Stroke Center Hospitals



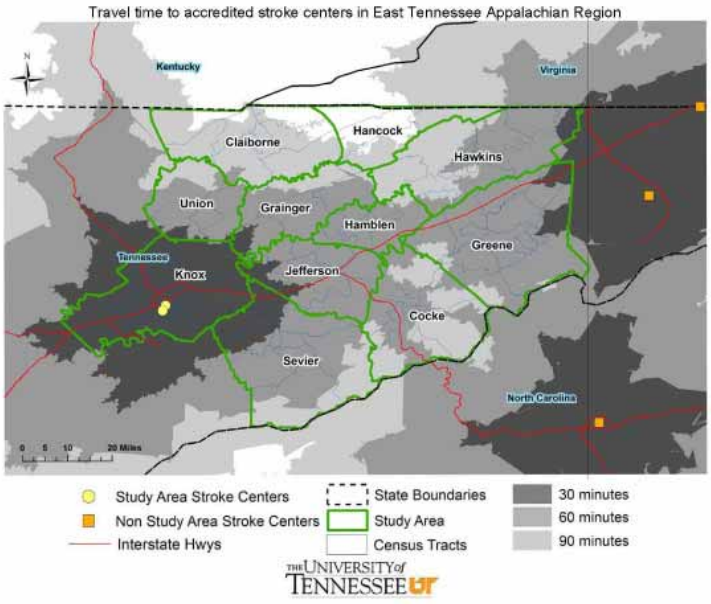
Data Sources: Hawaii Health Data Warehouse, Hawaii State Department of Health, Office of Health Status Monitoring, Vital Statistics and United States Census Bureau, American Community Survey

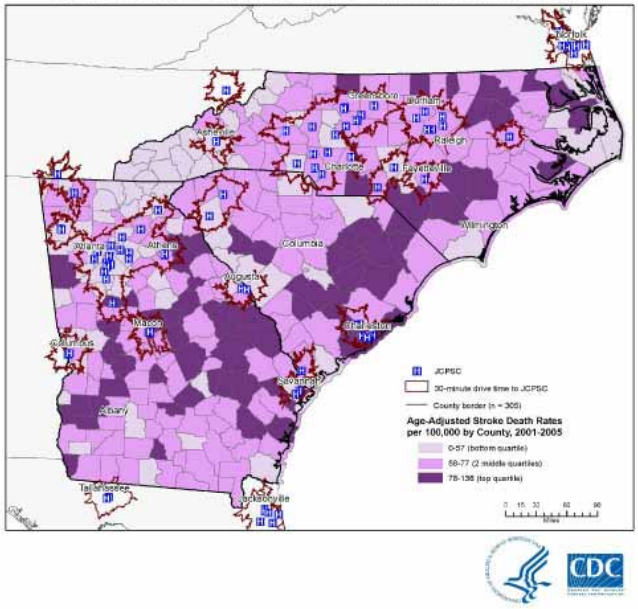
Drive Time to Stroke Center Hospitals and Population Centers: Planning Information for CDC 1422 Grantees, Washington State 2015

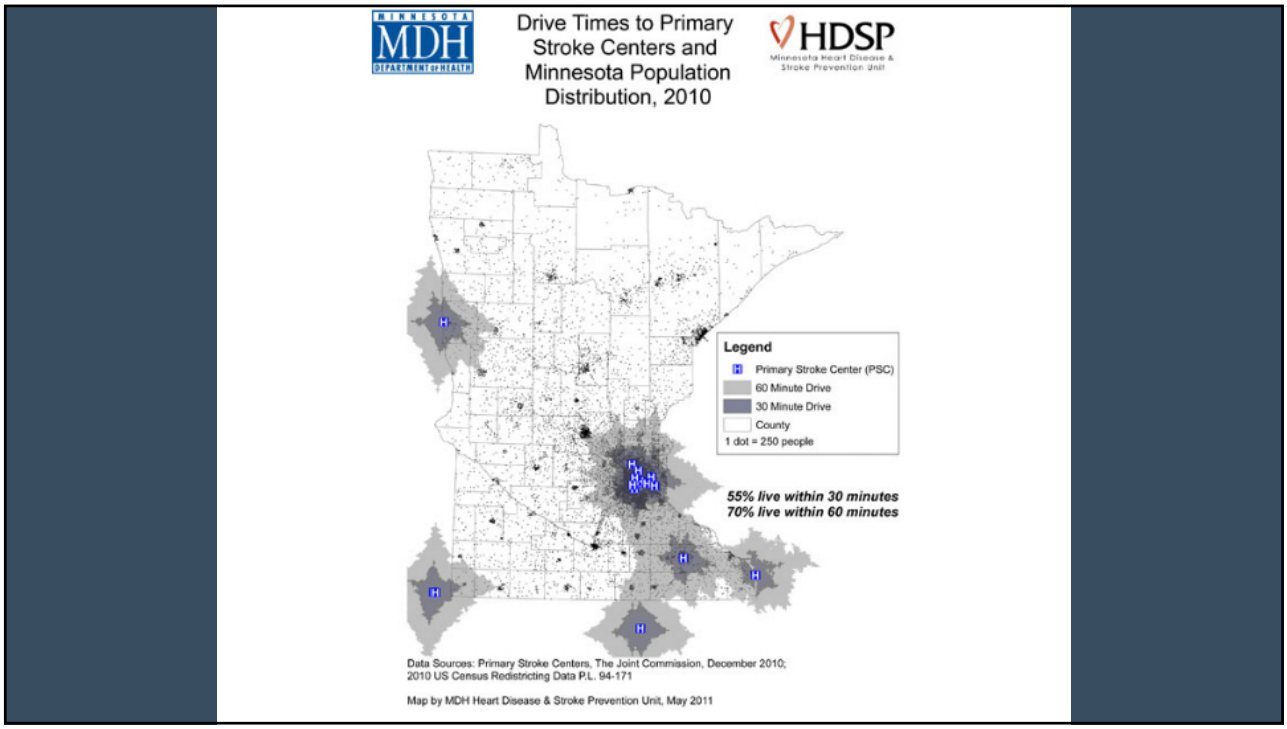


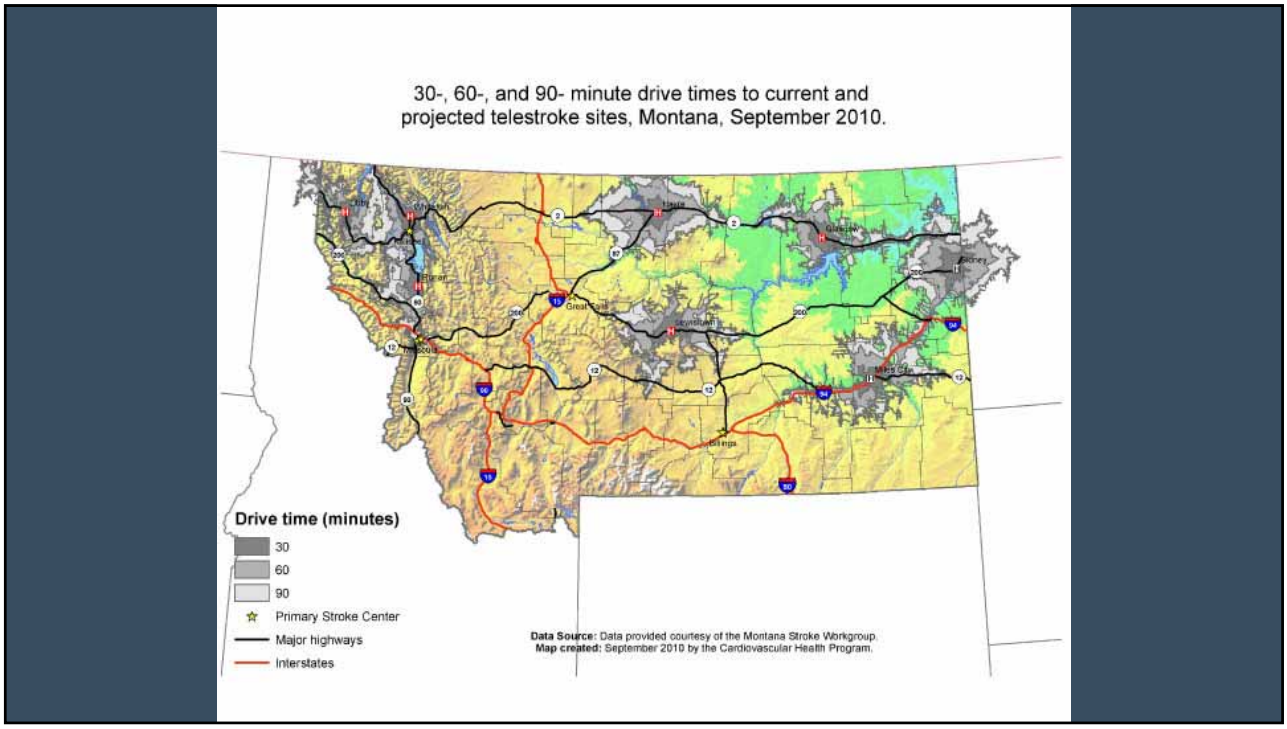
Hospital locations, 2013, geocoded by Washington State Department of Health, Division of Information Resources Management.
Drive times used Navteq 2010 street network data.

Updated: 3/14/2016
Dennis McDermot, Washington State Department of Health.


Travel time to accredited stroke centers in East Tennessee Appalachian Region
Kentucky
Virginia
Claiborne
Hancock
Hawkins
Union
Grainger
Hamblen
Greene
Tennessee
Knox
Jefferson
Cocke
Sevier
North Carolina
0 5 10 20 Miles
Study Area Stroke Centers
Non Study Area Stroke Centers
Interstate Hwys
State Boundaries
Study Area
Census Tracts
30 minutes
60 minutes
90 minutes
THE UNIVERSITY of TENNESSEE


Geographic Analysis of Drive Time to Certified Stroke Centers in the
Tri-State Stroke Network Region (South Carolina, North Carolina, Georgia)
Norfolk
Greensboro
Durham
Asheville
Raleigh
Charlotte
Fayetteville
Wilmington
Atlanta
Athens
Columbia
Augusta
Macon
Fort Jackson
Columbus
Savannah
Albany
Tallahassee
Jacksonville
JCPSC
30-minute drive time to JCPSC
County border (n = 305)
Age-Adjusted Stroke Death Rates
per 100,000 by County, 2001-2005
0-57 (bottom quartile)
58-77 (2 middle quartiles)
78-136 (top quartile)
CDC


MINNESOTA
MDH
DEPARTMENT of HEALTH
Drive Times to Primary Stroke Centers and Minnesota Population Distribution, 2010
HDSP
Minnesota Heart Disease & Stroke Prevention Unit
Legend
Primary Stroke Center (PSC)
60 Minute Drive
30 Minute Drive
County
1 dot = 250 people
55% live within 30 minutes
70% live within 60 minutes
Data Sources: Primary Stroke Centers, The Joint Commission, December 2010; 2010 US Census Redistricting Data P.L. 94-171
Map by MDH Heart Disease & Stroke Prevention Unit, May 2011


30-, 60-, and 90- minute drive times to current and projected telestroke sites, Montana, September 2010.
Drive time (minutes)
30
60
90
Primary Stroke Center
Major highways
Interstates
Data Source: Data provided courtesy of the Montana Stroke Workgroup.
Map created: September 2010 by the Cardiovascular Health Program.

Access to IV Thrombolysis

- Among the National Inpatient Sample 2004-2010, 304,152 patients from 26 states were reviewed.
- A higher proportion received rt-PA at PSCs than non-PSCs in all race/ethnic groups (white 7.6% versus 2.6%, black 4.8% versus 2.0%, Hispanic 7.1% versus 2.4%, other 7.2% versus 2.5%, all $P<0.001$)
- In a multivariable model, blacks were less likely to receive rt-PA than whites at non-PSCs (odds ratio=0.58, 95% CI 0.50 to 0.67) and PSCs (odds ratio=0.63, 95% CI 0.54 to 0.74)
- Hispanics were less likely than whites to receive rt-PA at PSCs (odds ratio=0.77, 95% CI: 0.63 to 0.95).

Aparicio HJ, et al. *J Am Heart Assoc* 2015;4:e001877.

Access to Mechanical Thrombectomy

- From 2016-2018, 206,853 admissions to 173 endovascular centers were reviewed. Overall utilization of MT was 8.4%.
- Utilization of MT for black/Hispanic patients was lower than that among white/non- Hispanic patients (7.0% versus 9.8%; $P<0.001$).
- Black/Hispanic patients were also less likely to receive IV-tPA (16.2% versus 20.5%; $P<0.001$) and to be admitted to the endovascular center after transfer from a different hospital (20.0% versus 30.1%; $P<0.001$).
- On multivariate linear regression analysis, insurance with Medicaid or uninsured status ($\beta=-0.153$; $P=0.029$), and black/Hispanic race/ethnicity ($\beta=-0.062$; $P=0.046$) were independently associated with lower institutional utilization of MT.

Rinaldo L, et al. *Stroke* 2019;50:2428-2432.

Carotid Artery Revascularization: CARE Registry

n=6633	Hispanic, n=152	Non-Hispanic Whites, n=6239	Blacks, n=181	Others, n=61	*P* Value*
Death, %	2.0	0.8	2.2	1.6	0.10
Stroke, %	4.6	3.1	7.2	4.9	0.03
MI, %	0.7	0.9	0.6	1.6	0.78
MACCE, %	5.9	4.5	8.8	6.6	0.04

- From 2007-2012, among 13,129 patients who underwent CAS, an increase in CAS utilization was observed in non-Hispanic whites and other groups, whereas the opposite was observed among Hispanics and blacks.

Wayangankar SA, et al. *Stroke* 2015;46:1525-1532.

Carotid Artery Revascularization: CARE Registry

- Among the CEA cohort, the black population had a higher proportion of patients with ASA grade 3 or 4 compared with other groups representing a vulnerable population predisposed to worse 30-day outcomes compared with other groups.
- Adherence to antiplatelet and statin therapy was significantly lower among blacks post-CEA.
- 30-day major adverse cardiac and cerebrovascular events were significantly higher in blacks.

Wayangankar SA, et al. *Stroke* 2015;46:1525-1532.

Carotid Endarterectomy: VQI Registry

- Black patients undergoing carotid endarterectomy (CEA) in the United States are more often symptomatic at presentation and have more comorbidities compared with white patients.
- 57,622 CEA patients from the VQI Registry were studied; 2909 (5.0%) were black, 34% were symptomatic. Of the 54,713 white patients, 30% were symptomatic.
- Black patients, compared with white patients, had a higher vascular disease burden and were less likely to be operated on in a high-volume hospital or by a high-volume surgeon.
- Black symptomatic patients, compared with white symptomatic patients, were more often operated on <2 weeks after the index neurologic symptom (47% vs 40%; P < .001).

Pothof AB, et al. J Vasc Surg 2018;68:426-35.

Carotid Endarterectomy: VQI Registry

- Perioperative stroke/death was comparable between black and white patients (symptomatic, 2.8% vs 2.2% [P 1⁄4 .2]; asymptomatic, 1.6% vs 1.3% [P 1⁄4 .2]), as was unadjusted survival at 3 years (93% vs 93%; P 1⁄4 .7).
- However, after adjustment, black patients did experience better long-term survival compared with white patients (hazard ratio, 0.8; 95% confidence interval, 0.7-0.9; P 1⁄4 .01).
- On multilevel logistic regression, race was not associated with perioperative stroke/death (odds ratio, 1.0; 95% confidence interval, 0.8-1.3; P 1⁄4 .98).

Pothof AB, et al. *J Vasc Surg* 2018;68:426-35.

Health Disparities in GWTG-Stroke

- Data were collected from 397,257 patients admitted with ischemic stroke to 1181 hospitals participating in the GWTG-Stroke program were evaluated from April 1, 2003- September 30, 2008.
  - The hospitals were participating in the Get With the Guidelines–Stroke Program (GWTG-Stroke).
  - 3 groups were analyzed: Black, Hispanic and White patients.
  - 7 evidence-based performance measurements were used to evaluate the quality of care of these patients.
  - Hospital characteristics were evaluated.

Schwamm et al. Circulation, 2010

Schwamm et al. Circulation, 2010 epub April 6

Health Disparities in GWTG-Stroke

- Blacks were 16 percent less likely than whites to receive the clot-busting drug tissue plasminogen activator (tPA) and to receive anticoagulants for atrial fibrillation.
- Blacks were 12 percent less likely than whites to receive deep vein thrombosis prevention and to be discharged with anti-clotting medications.
- Blacks were 9 percent less likely than whites to receive cholesterol-lowering therapy.
- Blacks were 15 percent less likely than whites and Hispanics were 18 percent less likely than whites to receive smoking cessation counseling.

Schwamm et al. Circulation, 2010

Health Disparity Interventions: Hypertension

- Among Black and Hispanic poststroke, home care patients, the addition of a 30-day nurse practitioner transitional care program with/without a 60-day health coach program to usual care was not associated with a significant change in systolic BP.
- A culturally tailored, skills-based educational intervention with telephone follow-up did not reduce systolic BP more than standard discharge care in a diverse racial/ethnic cohort of patients with mild/ moderate stroke/TIA.
- A multicomponent intervention consisting of clinics with advanced practice providers, self-management support, group clinics, report cards, decision support, and ongoing care coordination did not reduce systolic BP compared with usual care.

Feldman PH, et al. *Am J Hypertens.* 2020;33:362–370.
Boden-Albala B, et al. *JAMA Neurol.* 2019;76:20–27.
Cheng EM, et al. *Circ Cardiovasc* 18;11:e003228.

Health Disparity Interventions: Diabetes Mellitus

- Evidence from 2 RCTs have demonstrated the effectiveness of interventions targeting patients, providers, and health systems although these interventions have shown less success among racial/ethnic minorities other than Black and Latino individuals.
- An intervention consisting of group education sessions, counseling, and behavioral coaching by nurses and community health workers reduced glycosylated hemoglobin in Korean Americans with diabetes.
- A translated, culturally tailored version of the effective Diabetes Prevention Program-based lifestyle intervention lowered glycosylated hemoglobin and weight in Chinese immigrants at risk of diabetes.

Peek ME, et al. *Med Care Res Rev.* 2007;64(5 suppl):101S–156S.
Kim MT, et al. *Am J Prev Med.* 2015;49:726–737.
Yeh MC, et al. *Diabet Med.* 2016;33:547–551.

Health Disparity Interventions: The Beauty Shop

- 30 black beauticians were educated about stroke warning signs and risk factors in 2 large urban areas in the US. The beauticians then educated their clientele.
- 383 women completed an initial and follow-up survey, 78% were <60 years old, 69% had some college education, 41% had hypertension, and 12% had diabetes.
- Knowledge of 3 warning signs significantly improved from the baseline survey (40.7%) to the final survey (50.6%), and similar improvements in knowledge were seen in both study regions.
- Although there was no improvement in knowledge of 3 risk factors, 94% knew to call 911 for stroke symptoms, an 8% improvement over baseline (*P*=0.002).

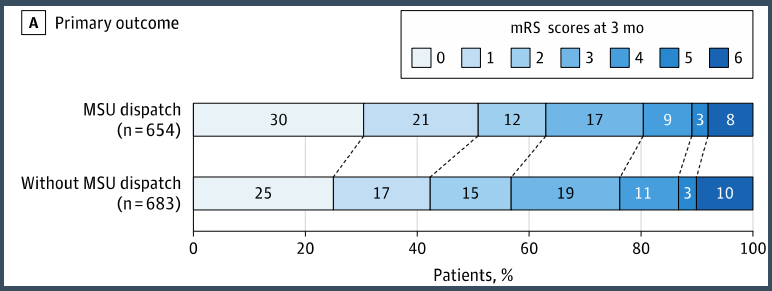
Kleindorfer D, et al. *Stroke* 2008;39:2331-2335.

Mobile Stroke Care: B-PROUD

- Compared simultaneous dispatch of an MSU and a conventional ambulance (n = 749) vs conventional ambulance alone (n = 794).
- The primary outcome was the distribution of modified Rankin Scale (mRS) scores at 90-days after transport

Ebinger M, et al. *JAMA* 2021;325(5):454-466

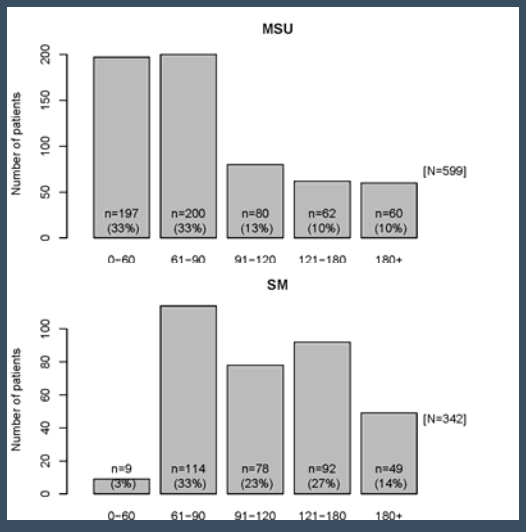
Mobile Stroke Care: B-PROUD



- Mobile stroke transport and treatment results in a higher proportion of good or excellent outcomes after stroke

Ebinger M, et al. *JAMA* 2021;325(5):454-466

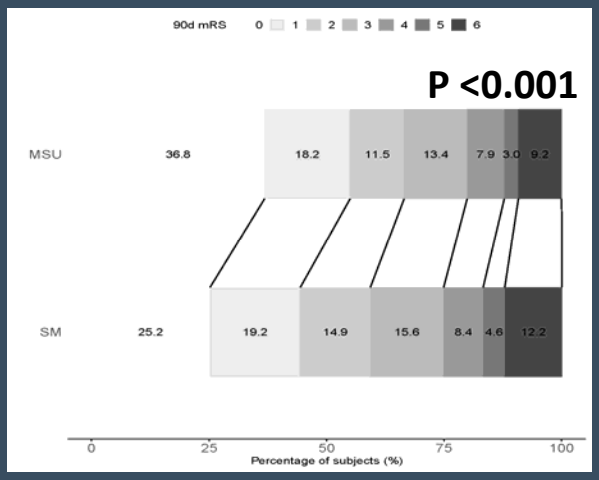
BEST-MSU



- 617 Patient transported by MSU vs. 430 via conventional ambulance
- Proportion of patient treated within the “Golden Hour”
  - 33% on MSU
  - 3% on conventional ambulance

Grotta J, et al. *ISC and PRESTO presentations, 2021*

BEST-MSU



- For every 100 patients treated with an MSU rather than conventional ambulance,
  - 27 will have less final disability,
  - 11 more will be disability-free
- **NNT = 9**
- **Potential to reduce health disparities in urban centers**

Grotta J, et al. *ISC and PRESTO presentations, 2021*

Health Disparity Interventions: Future Direction

- We need more studies recruiting and treating minority patients in non-traditional settings (e.g. barbershops and churches)
- We need to utilize more mobile health technology interventions delivered by nonphysicians which would help us to meet patients where they are.
- We need more stroke risk factor and signs/symptoms education through social media platforms
- We need more investment in prehospital stroke systems
- We need post-acute care systems which address health disparities (e.g. community-based stroke secondary prevention clinics, faith-based education)

Levine DA, et al. *Stroke* 2020;51:3425–3432.

Questions?

Cleveland Clinic

Every life deserves world class care.