Disparities in Risk Factors for Cardiovascular Health & Disease

How Far Have We Come and What Remains to be Done?

Martha L. Daviglus, MD, PhD
Deaths Attributable to Cardiovascular Disease (United States: 1900–2010)

Go A et al. Circulation 2014;129:e28-e292
Cardiovascular Disease and Other Major Causes of Death by Sex and Race/Ethnicity
(United States: 2010)

A -- CVD and congenital heart disease, B -- Cancer, C -- Accidents
D -- Chronic Lower Respiratory Disease, E -- Diabetes, F -- Alzheimer Disease
Go A et al. Circulation 2014;129:e28-e292
Death Rates for Heart Disease by Sex, Race, and Hispanic origin: US, 1950-2010

Deaths per 100,000 resident population

- White males
- Black males
- Hispanic/Latino Males
- White females
- Black females
- Hispanic/Latino females

Health, United States, 2012
Risk Factors for Coronary Heart Disease

Factors of Risk in the Development of Coronary Heart Disease—Six-Year Follow-up Experience

The Framingham Study

Kannel, et al. Annals Internal Med
1961;55:33-50
Efforts to Understand and Address CVD Risk Disparities

How Far Have We Come?
Prevalence of Current Smoking Among Adults Ages 18+ Years by Race/Ethnicity and Sex (National Health Interview Survey: 2009–2011)

Go A et al. Circulation 2014;129:e28-e292
Age-Standardized* Prevalence of Current Cigarette Smoking Among HCHS-SOL Participants by Sex and Hispanic Background

*Age standardized to the Census 2010 US population
Age-adjusted Prevalence of Obesity, by Sex and Race and Hispanic Origin among Adults Ages 20+
United States, 2011–2012

http://www.cdc.gov/nchs/data/databriefs/db131.htm
Age-Standardized* Prevalence of Obesity Among HCHS-SOL Participants by Sex and Hispanic Background

*Age standardized to the Census 2010 US population

Daviglus et al. JAMA 2012;308:1775-84
Mean Serum Total Cholesterol Among Adults Ages ≥20 years by Race/Ethnicity and NHANES Survey Year

Go A et al. Circulation 2014;129:e28-e292
Mean Serum Total Cholesterol Levels Among HCHS-SOL Participants by Sex and Hispanic Background

*Age standardized to the Census 2010 US population

Daviglus et al. JAMA 2012;308:1775-84
Age-Adjusted Prevalence of High Blood Pressure in Adults Ages ≥20 Years of Age by Race/Ethnicity, Sex, and NHANES Survey Year

Go A et al. Circulation 2014;129:e28-e292
Age-Standardized* Prevalence of High Blood Pressure Among HCHS-SOL Participants by Sex and Hispanic Background

*Age standardized to the Census 2010 US population

Daviglus et al. JAMA 2012;308:1775-84
Awareness, Treatment, and Control of High Blood Pressure by Race/ Ethnicity (NHANES: 2007–2010)

Go A et al. Circulation 2014;129:e28-e292
Awareness, Treatment, and Control of High Blood Pressure by Hispanic Background (HCHS-SOL)

Source: Hispanic Community Health Study Data Book
Age-Adjusted Prevalence of Physician-Diagnosed Type 2 Diabetes in Adults Ages ≥20 years by Race/ Ethnicity and Sex (NHANES: 2007–2010)

Go A et al. Circulation 2014;129:e28-e292
Age-Standardized* Prevalence of Type 2 Diabetes Among HCHS-SOL Participants by Sex and Hispanic Background

<table>
<thead>
<tr>
<th>Group</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>16.7</td>
<td>17.2</td>
</tr>
<tr>
<td>Cuban</td>
<td>13.2</td>
<td>13.9</td>
</tr>
<tr>
<td>Dominican</td>
<td>18.2</td>
<td>18.0</td>
</tr>
<tr>
<td>Mexican</td>
<td>19.3</td>
<td>18.5</td>
</tr>
<tr>
<td>Puerto Rican</td>
<td>16.2</td>
<td>19.4</td>
</tr>
<tr>
<td>Central American</td>
<td>16.3</td>
<td>17.9</td>
</tr>
<tr>
<td>South American</td>
<td>10.1</td>
<td>9.8</td>
</tr>
</tbody>
</table>

*Age standardized to the Census 2010 US population

Daviglus et al. JAMA 2012;308:1775-84
Persons With Health Insurance Coverage by Race and Hispanic Background, 2012

- Non-Hispanic White: 88.9%
- Black: 81.0%
- Asian: 84.9%
- Hispanic/Latino: 70.9%
Age-Standardized* Prevalence of Health Insurance Coverage among HCHS-SOL Participants by Hispanic Background

*Age standardized to the Census 2010 US population

Daviglus et al. JAMA 2012;308:1775-84
Age-Standardized Prevalence of Number of Ideal Cardiovascular Health Criteria, US adults Ages ≥20 Years -- Overall and by Race/Ethnicity (NHANES: 2009-2010)
Age-Adjusted Prevalence of Low Risk Profile at Year 20 by healthy lifestyle factors (HLFs) from Year 0-20 by Race and Sex – the CARDIA Study

![Bar chart showing prevalence of low risk profile by race and sex.](chart.jpg)

*Based on the average of Y0, Y7 and Y20 data

Liu K et al. *Circulation*. 2012;125:996-1004
Cardiovascular disease (CVD) Incidence Rates by Number of Ideal Health Metrics, All Participants and by Race – the Northern Manhattan Study

Based on NHANES and other national surveys:

- Mean serum cholesterol levels declined among all groups, although Mexican Americans continued to have higher levels compared to non-Hispanic whites.
- Prevalence of high blood pressure remained markedly among high Non-Hispanic black men and women compared to non-Hispanic whites.
- Mexican Americans had lower rates of awareness, treatment, and control of high blood pressure compared to non-Hispanic whites and non-Hispanic blacks.
- Non-Hispanic blacks had higher rates of self-reported diabetes compared to non-Hispanic whites and Mexican Americans.
Rates of smoking were high among non-Hispanic white, and non-Hispanic black men.

Prevalence of obesity by sex was highest among non-Hispanic black women and Hispanic men.

Few adult Americans had any 6 or all 7 ideal cardiovascular health criteria.

Despite decades of research on CVD risk factors, and progress in lowering the burden of CVD among all major US race/ethnic groups, disparities in CVD risk persist.
The HCHS-SOL revealed substantial variations in CVD risk burden across diverse Hispanic/Latino groups, with some groups facing markedly high rates of various risk factors compared to others. For example, compared to other Hispanic groups:

- Puerto Rican individuals had higher rates of cigarette smoking and obesity.
- Rates of diabetes were higher among Puerto Rican and Mexican individuals.
- Ideal cardiovascular health as defined by the AHA has been shown to be associated with lower rates of CVD outcomes among diverse race/ethnic groups.
Next Steps

What should be done to address the disparities in CVD risk?
Future Needs for Research and Public Health Action

• To develop innovative interventions including community health workers to provide patient/community guidance and education to effectively manage chronic diseases/conditions such as high blood pressure and diabetes.

• To engage in multidisciplinary collaboration and partnerships to conduct health disparities research with involvement of minority investigators.

• To engage in community coalition-building to find effective community solutions.

• To address social and environmental factors such as school, work, residential, and other physical environments.
Diverse US Metropolitan Areas

New York, NY
H/L: 28.6%
NHB: 25.5%
NHW: 33.3%

Miami, FL
H/L: 70.0%
NHB: 19.2%
NHW: 11.9%

Chicago, IL
H/L: 28.9%
NHB: 32.9%
NHW: 31.7%

San Diego, CA
H/L: 28.8%
NHB: 6.7%
NHW: 45.1%

Los Angeles, CA
H/L: 48.5%
NHB: 9.6%
NHW: 28.7%

Houston, TX
H/L: 43.6%
NHB: 23.7%
NHW: 25.6%

New York, NY
H/L: 28.6%
NHB: 25.5%
NHW: 33.3%
Healthy Chicago – A Public Health Agenda

- Comprehensive public health agenda established in 2011.
- Recognizes that “the improvement of the public’s health in Chicago requires a commitment to health equity and the elimination of racial and ethnic disparities.”
- Strategies include:
  - For smoking cessation: expansion of smoke-free environments; support for vulnerable populations (smoking cessation clinics, nicotine patch therapy).
  - For obesity prevention: expansion of access to health foods in food-desert areas; healthy vending; pedestrian plan; promotion of bicycling.
- Measurable targets to be achieved by 2020.

From:
- Healthy Chicago 2012 Annual Report, Chicago Department of Public Health
- Healthy Chicago: A Public Health Agenda, Chicago Department of Public Health
Increasing Access to Healthy Food

**Citywide Food Plan**
- Build healthier neighborhoods
- Grow food
- Expand healthy food enterprises
- Strengthen the food safety net
- Serve healthy food and beverages
- Improve eating habits

**Healthy Vending**
- Healthy vending machines in all City buildings
- Launched Healthy Vending Challenge
- Follow efforts of Parks and CPS

**Increasing Access to Healthy Food**

**Produce Carts**
- 15 carts in neighborhoods for 2013
- 15 planned for 2014
- ~20 jobs created
- 40 persons trained in retail sales

**Urban Farms**
- Partnership with Growing Power
- 5 acres of vacant lots available
- Training for local farmers and help installing equipment
- 15 acres overall operate as farms or breaking ground

From: “Healthy Chicago: 2013 Year in Review.” A presentation by Bechara Choucair, MD, Commissioner, Chicago Department of Public Health, March 2014
Healthy Chicago Initiatives

Increased Opportunities for Physical Activity

Divvy Bike Share Program
- 2,035 bikes, 300 stations
- 12,133 annual memberships
- 131,984 24-hour passes
- 763,790 trips, >1.7 million miles

Dearborn St. Complete Street

From: “Healthy Chicago: 2013 Year in Review.” A presentation by Bechara Choucair, MD, Commissioner, Chicago Department of Public Health, March 2014

Before
- 200 miles of on-street protected, buffered and shared bike lanes
- More than 13,000 bike racks, and sheltered parking
- A 645-mile network of biking facilities by 2020 will provide a bicycle accommodation within half-mile of every Chicagoan.

After
Conclusion

• Comprehensive, multifaceted public health approaches – both targeting individuals and aimed at upstream factors such as neighborhood structures, programs, and policies -- are necessary to address the persistent burden of CVD risk factors and CVD disparities, and to prevent development of adverse CVD risk factors starting early in life.

• A shift is necessary from past efforts addressing single risk factors to overall CVD risk profile.
“... We need to learn much more about what causes disparities — including the role of society, the environment, genes and socioeconomics — and to find effective ways of overcoming or changing them. Our discoveries should translate into health benefits for everyone.”

-- Francis S. Collins, MD, PhD, NIH Director (current)

[commenting on the transition of the National Center on Minority Health and Health Disparities (NCMHD) to the National Institute on Minority Health and Health Disparities (NIMHD)]
Thank You!
Gracias!

Questions
Trends in Prevalence of Obesity (BMI $>30$ kg/m$^2$) among Men Ages 20 Years and Older. 
NHANES 2003-04 to 2011-12

Trends in Prevalence of Obesity (BMI $\geq 30$ kg/m$^2$) among Women Ages 20 Years and Older. NHANES 2003-04 to 2011-12

Prevalence of Current Cigarette Smoking Among HCHS-SOL Participants by Age and Sex and by Hispanic Background

Source: Hispanic Community Health Study Data Book
Prevalence of Obesity Among HCHS-SOL Participants by Age and Sex and by Hispanic Background

Source: Hispanic Community Health Study Data Book
Prevalence of Diabetes Among HCHS-SOL Participants by Age and Sex and by Hispanic Background

Source: Hispanic Community Health Study Data Book
Age-adjusted Prevalence of Self-Reported Overweight/Obesity by Race among Adults Ages 18 and Older, NHIS 2012

<table>
<thead>
<tr>
<th>Race</th>
<th>Overweight</th>
<th>Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic White</td>
<td>34.0</td>
<td>27.1</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>34.3</td>
<td>36.3</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>38.4</td>
<td>31.5</td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
<td>30.7</td>
<td>41.2</td>
</tr>
</tbody>
</table>

Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2012; Vital and Health Statistics, Series 10 Number 260
Age-Adjusted Prevalence of Self-Reported Physician-Diagnosed Diabetes among Adults Ages ≥18 Years, NHIS 2012

Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2012; Vital and Health Statistics, Series 10 Number 260
Prevalence of Meeting 2008 Federal Physical Activity Guidelines Among Adults Ages ≥18 years by Race/ Ethnicity and Sex (NHIS: 2012)

Go A et al. Circulation 2014;129:e28-e292
Amount of Recreational Physical Activity among Hispanic/Latino Adults by Age and Sex and by Hispanic Background (HCHS-SOL)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Average mins/day (Men)</th>
<th>Average mins/day (Women)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 18-44</td>
<td>43.1</td>
<td>19.9</td>
</tr>
<tr>
<td>Age 45-64</td>
<td>15.8</td>
<td>9.9</td>
</tr>
<tr>
<td>Age 65-74</td>
<td>12.7</td>
<td>10.2</td>
</tr>
</tbody>
</table>


Source: Hispanic Community Health Study Data Book
Prevalence of Coronary Calcium Among US Adults Ages 45-84 Years by Sex and Race/Ethnicity. The Multi-Ethnic Study of Atherosclerosis

AHA 2020 Strategic Impact Goal and Criteria for Ideal Cardiovascular Health

“By 2020, to improve the cardiovascular health of all Americans by 20 percent, while reducing deaths from cardiovascular diseases and stroke by 20 percent”

Lloyd-Jones et al. Circulation 2010; 121: 586-613

<table>
<thead>
<tr>
<th>Goal/Metric</th>
<th>Ideal Cardiovascular Health Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current smoking</td>
<td>Never or quit &gt;12 mo ago&lt;br&gt;Never tried; never smoked whole cigarette</td>
</tr>
<tr>
<td>Adults &gt;20 y of age</td>
<td>&lt;25 kg/m²</td>
</tr>
<tr>
<td>Children 12–19 y of age</td>
<td>&lt;85th Percentile</td>
</tr>
<tr>
<td>Body mass index</td>
<td>≥150 min/wk moderate intensity or&lt;br&gt;≥75 min/wk vigorous intensity or combination</td>
</tr>
<tr>
<td>Adults &gt;20 y of age</td>
<td>≥60 min of moderate- or&lt;br&gt;vigorous-intensity activity every day</td>
</tr>
<tr>
<td>Children 12–19 y of age</td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
</tr>
<tr>
<td>Adults &gt;20 y of age</td>
<td>4–5 Components*</td>
</tr>
<tr>
<td>Children 5–19 y of age</td>
<td>4–5 Components*</td>
</tr>
<tr>
<td>Healthy diet score*</td>
<td></td>
</tr>
<tr>
<td>Adults &gt;20 y of age</td>
<td>&lt;200 mg/dL†</td>
</tr>
<tr>
<td>Children 5–19 y of age</td>
<td>&lt;170 mg/dL†</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td></td>
</tr>
<tr>
<td>Adults &gt;20 y of age</td>
<td>&lt;120/≤80 mm Hg†</td>
</tr>
<tr>
<td>Children 6–19 y of age</td>
<td>≤90th Percentile†</td>
</tr>
<tr>
<td>Blood pressure</td>
<td></td>
</tr>
<tr>
<td>Adults &gt;20 y of age</td>
<td>&lt;100 mg/dL†</td>
</tr>
<tr>
<td>Children 8–19 y of age</td>
<td>≤90th Percentile†</td>
</tr>
<tr>
<td>Fasting plasma glucose</td>
<td></td>
</tr>
<tr>
<td>Adults &gt;20 y of age</td>
<td></td>
</tr>
<tr>
<td>Children 12–19 y of age</td>
<td></td>
</tr>
</tbody>
</table>

*The committee selected 5 aspects of diet to define a healthy dietary score. The score is not intended to be comprehensive. Rather, it is a practical approach that provides individuals with a set of potential concrete actions. A comprehensive rationale is set forth in the text of this document, and a comprehensive set of nutrition recommendations is provided in the 2006 Nutrition Guidelines.†Untreated values.
Prevalence of CVD Risk Profiles by Hispanic/Latino Group

Values weighted for survey design and non-response and adjusted for age. Prevalence with 95% CI are reported.

Risk factors: **Hypertension** SBP/DBP >140/>90 or on treatment. **Hypercholesterolemia**, total cholesterol >240 mg/dL HDL-C <40 mg/dL LDL-C >160 mg/dL or on treatment. **Obesity**, BMI >30kg/m2; **Diabetes**, fasting glucose >126 mg/dL 2h-post-load plasma glucose >200 mg/dL A1c >6.5%, or use of diabetes medications. **Smoking**, currently smoking cigarettes.

Daviglus et al. JAMA 2012;308(17):1775-84
Dissemination of Study Findings to Participants and Communities

• Communication of findings to participants, communities, and health care providers is important for educating communities about the risks they face, and for facilitating provision of appropriate health care.

• Data book/booklets prepared by NIH describing the findings of study in lay language to study participants.
Health Equity

- Refers to achievement of the **highest level of health** possible.
- Requires:
  - Attention to the **root causes of health disparities** (e.g., social determinants of health)
  - Promotion of **equal opportunities** to all
  - **Better distribution** of societal social and economic wealth and **resources**
Social Inequities

“Systematic and unjust distribution of social, economic, political & environmental resources needed for health.”

• High poverty
• Lack of job security
• Lower income
• Less wealth
• Lack/poor access to quality healthcare
• Poor quality of education
• Inadequate/overcrowded housing

• Inadequate work conditions
• Poor access to resources (e.g. healthy food; food desert)
• Saturation of fast food and liquors stores
• Poor public transportation
• Neighborhood segregation
• Racial/social discrimination

Source: Whitehead M. et al
Prevalence of Coronary Calcium* Among Adults Ages 45-84 Years by Sex and Race/Ethnicity. The Multi-Ethnic Study of Atherosclerosis (MESA)

![Chart showing the prevalence of coronary calcium by sex and race/ethnicity.](chart.png)

*Coronary calcium score >0

### Table 4. Risk of Coronary Heart Disease Associated with Coronary-Artery Calcium Score in Four Racial or Ethnic Groups.*

<table>
<thead>
<tr>
<th>Racial or Ethnic Group</th>
<th>Major Coronary Event†</th>
<th>Any Coronary Event</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Hazard Ratio (95% CI)‡</td>
</tr>
<tr>
<td>White</td>
<td>41</td>
<td>1.17 (1.06–1.30)</td>
</tr>
<tr>
<td>Chinese</td>
<td>6</td>
<td>1.25 (0.95–1.63)</td>
</tr>
<tr>
<td>Black</td>
<td>18</td>
<td>1.35 (1.16–1.57)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>24</td>
<td>1.15 (1.02–1.29)</td>
</tr>
</tbody>
</table>

*CAC denotes coronary-artery calcium score, and CI confidence interval.
†Major coronary events were myocardial infarction and death from coronary heart disease.
‡Hazard ratios were calculated with the use of Cox regression for coronary heart disease (major event and any event) for baseline levels of $\log_2(CAC+1)$ after adjustment for risk factors and interactions between racial or ethnic group and coronary calcium score and between racial or ethnic group and diabetes (the only significant interaction). Hazard ratios are calculated on the basis of a doubling of CAC+1.

Implementation of the Healthy People 2020

Overarching Goals

• Attain high-quality, longer lives free of preventable disease, disability, injury, and premature death

• **Achieve health equity, eliminate disparities, and improve the health of all groups**

• Create **social and physical environments that promote good health** for all

• Promote quality of life, healthy development, and **healthy behaviors** across all life stages

www.healthypeople.gov/2020