Health Disparities: Vulnerable Populations

- Racial/Ethnic Minorities
- Low-income groups
- Lesbian, Gay, Bisexual, And Transgender (LGBT)
- Persons Who Need Chronic or End-Of-Life care
- Disabled Persons
- Residents Of Rural Areas
- Older Adults (age ≤65)
- Children (Under age 18)
- Women
“The Negro baby born in America today, regardless of the section of the nation in which he is born, has about one-half as much chance of completing high school as a white baby born in the same place on the same day; one third as much chance of completing college; one third as much chance of becoming a professional man; twice as much chance of becoming unemployed; about one-seventh as much chance of earning $10,000 a year; a life expectancy which is seven years shorter; and the prospects of earning only half as much.”
1963- Civil Rights Act passed.

1980- U.S life expectancy ~ 74 years; minorities constituting 25% of the U.S populations – shorter life expectancies and higher rates of heart disease, diabetes, cancer, stroke, substance abuse, infant mortality, and low birth weight.

1985- NIH task force on Black Minority Health to investigate health disparities: convened by the Department of Health and Human Services.

2002- Institute of Medicine releases report *Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare*, suggesting that, “bias, prejudice, and stereotyping by healthcare providers may contribute to differences in care.”

2002- Congress directed the Agency for Healthcare Research and Quality (AHRQ) to produce an annual report to track disparities related to “racial factors and socioeconomic factors in priority populations”.

2010- Congress appoints the National Institute on Minority Health and Health Disparities to lead the planning, review, coordination, and evaluation of NIH’s minority health and health disparities research activity.
Life Expectancy By Race: United States, 1970-2010

Difference In Life Expectancy Between Black And White Persons: Contributing Causes

Kochanek KD, et al. NCHS Data 2013
CVD Racial/Ethnic Disparities: Challenges to Understand

- Accelerated Aging – earlier onset of disease
- Racial differences in the severity and progression of disease
- Persistence of residual effect of race/ethnicity when SES is controlled
- Distinctive risk profile in black men
- Complex SES profile – e.g. migration influence
- Education and scientific workforce pipeline for under-represented minorities: intentional/unintentional bias

Adapted from Williams DR. Ann NY Acad Sci 2010
Non-Equivalence of Socioeconomic Factors By Race/Ethnicity

- Examples of distinctive social exposures
  - Early toxic exposures: adversity, environmental
  - Sleep
  - Employment
  - Incarceration
  - Racism
  - Acculturation

Adapted from Williams DR, Ann NY Acad Sci, 2010
Intergenerational Transmission of Disease States via the Adult Stressful Intrauterine Environment

Emerging Pregnancy Themes and Cardiovascular Health

Adverse Outcomes: Black and white racial differences in thrombotic risk factors

HTN in Pregnancy: Offspring HTN, HTN, CVD, CMP, Inflammation, Pre-eclampsia – endothelial dysfunction

Trajectory Of Pregnancy Related Weight Gain

Prematurity: LBW, infant mortality=life expectancy,

Impact of parity
Preterm Birth
Role of chronic stress on maternal and fetal outcomes

Basic Science Research

Infancy/Childhood:
Science of Childhood Development
Poverty By Race/Ethnicity In The United States, 2012

- White (13%)
- Black (35%)
- Hispanic (33%)
- Other (22%)

Poverty By Age In The United States, 2012

- Children 0-18
- Adults 19-64
- 65+

Kaiser Family Foundation. kff.org/other/state-indicator/poverty-rate-by-raceethnicity/
Kaiser Family Foundation. kff.org/other/state-indicator/poverty-rate-by-age/
Supportive Relationships Restore Disrupted Stress Response

Limits Socioeconomic Mobility Through Limited Access To Quality Education

Access to care and the quality of care

Weakened community and neighborhood infrastructure

Non-adherence to good health practices

Institutional neglect and disinvestment in poor, segregated communities

Exposure to elevated levels of economic hardship and other chronic/acute stressors at all levels

Pathways Through Which Segregation Can Adversely Affect Health

### Unemployment

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>2006</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>5.9</td>
<td>11.3</td>
</tr>
<tr>
<td>Male</td>
<td>5.8</td>
<td>8.8</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>4.7</td>
<td>8.3</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>10.4</td>
<td>16.5</td>
</tr>
<tr>
<td>Hispanic</td>
<td>7.2</td>
<td>12.4</td>
</tr>
<tr>
<td>Asian American/Pacific Islander</td>
<td>6.2</td>
<td>9.7</td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
<td>8.8</td>
<td>15.8</td>
</tr>
</tbody>
</table>

### Risks For Acute MI

Athar HM. *MMWR.* 2013
### Association Of Incarceration History With Subsequent Access To Care (CARDIA)

<table>
<thead>
<tr>
<th></th>
<th>No regular source of care</th>
<th>No health insurance</th>
<th>Limited medical care</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adjusted Odds Ratio* (95% CI)</td>
<td>Adjusted Odds Ratio (95% CI)</td>
<td>Adjusted Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>All participants (N=650)</td>
<td>2.5 (1.3, 4.8)</td>
<td>2.5 (1.4, 4.7)</td>
<td>4.3 (2.1, 8.7)</td>
</tr>
<tr>
<td>Black men (N=170)</td>
<td>2.9 (1.2, 6.6)</td>
<td>2.4 (1.1, 5.4)</td>
<td>6.5 (2.2, 18.8)</td>
</tr>
<tr>
<td>Participants with high school education or less (N=287)</td>
<td>2.5 (1.1, 5.5)</td>
<td>3.3 (1.5, 6.9)</td>
<td>5.1 (2.0, 13.2)</td>
</tr>
</tbody>
</table>

*Adjusted for sex, race, age, and socioeconomic status; All p-values < 0.03


---

**Incarceration of a Household Member and Hispanic Health Disparities: Childhood Exposure and Adult Chronic Disease Risk Behaviors**

Annie Gjelsvik,
### Mental Health Studies

<table>
<thead>
<tr>
<th>Positive</th>
<th>Negative</th>
<th>No Association</th>
<th>Conditional Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-being</td>
<td>++++</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>++++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Control/mastery</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Psychological distress</td>
<td>++++++</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Major depression</td>
<td>++++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Anxiety disorder</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Other mental disorder</td>
<td>++</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anger</td>
<td>+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Physical Health Studies

<table>
<thead>
<tr>
<th>Positive</th>
<th>Negative</th>
<th>No Association</th>
<th>Conditional Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-rated health</td>
<td>++++++</td>
<td></td>
<td>+++</td>
</tr>
<tr>
<td>Other self-report</td>
<td>++++++</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>++++++</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Very low birth weight</td>
<td>++++</td>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>

### Subclinical Cardiovascular Disease

- CAC: +
- LVH: +
- Aortic plaque: +
- IMT: +/-

### Health Behavior Studies

- Smoking: ++
- Alcohol: ++

### Health Outcomes

- Mortality: +
- Cancer: +/-
- Myocardial Infarction: +/-
- Stroke: +

---

Adapted from Williams et al, Am J Pub Health 2003
Sleep Deficiency: Quantity and Quality

Extreme sleep durations more common in low income and minority groups

Examples:
- Insomnia (Increased risk of MI [1.5-3.9])
- Sleep Disordered Breathing

Cohen's d

| Effect Sizes For Insomnia Blacks & Whites And Sleep Disordered Breathing Sx |
|------------------|------------------|------------------|------------------|
| Sleep Complaints | Sleep Onset Latency Complaints | Wake After Sleep Onset Complaints | Terminal Wakefulness Complaints |
| SDB Severity | SDB Prevalence | SDB Total Sleep Time |
| -0.30 | -0.23 | -0.19 | -0.07 |
| 0.02 | 0.10 | 0.13 |

Examples:
- Insomnia (Increased risk of MI [1.5-3.9])
- Sleep Disordered Breathing

Ruiter ME, et al. Behavioral Sleep Medicine, 2011
Conceptual Model: Social and Environmental Factors, Sleep, and Cardiovascular Disease Outcomes

Social and Environmental Mechanisms
- SES
- Perceived discrimination
- Occupational Stress
- Neighborhood
- Access to treatment
- Acculturation

CV Outcome Mechanisms
- Blood Pressure
- Coronary artery calcification
- Insulin Resistance
- Impaired glucose tolerance
- Telomere Length
- Treatment adherence

CV Outcomes/Risk Factors
- Obesity
- Hypertension
- Diabetes
- Carotid atherosclerosis (IMT)

Sleep quality, duration, and disorders

Race/Ethnicity

Genes

Sleep Race/Ethnicity: Needed Research

- Mechanisms for racial/ethnic disparity
- Protective factors to promote healthy sleep
- Methodology: Definitions – Short, long, insufficient (inter-individual differences)
- Stress: Prospective studies, bidirectional [relative with sleep, moderators (environment, personality, immigration, genetics)]
- Neighborhood: Housing policy, safety (barriers: violence, promotion of increased nocturnal street lights, noise, temperature, window shading)
Racial/Ethnic and Gender Gaps in the Use of and Adherence to Evidence-Based Preventive Therapies Among Elderly Medicare Part D Beneficiaries After Acute Myocardial Infarction.

Lauffenburger, Julie C. PharmD; Robinson, Jennifer G. MD, MPH; Oramasionwu, Christine PharmD, PhD, BCPS; Fang, Gang PharmD, MS, PhD  [Article] Circulation. 129(7):754-763, February 18, 2014.

This retrospective cohort study used 2007 to 2009 Medicare service claims among Medicare beneficiaries >=65 years of age who were alive 30 days after an index acute myocardial infarction hospitalization in 2008. Multivariable logistic regression models examined racial/ethnic (white, black, Hispanic, Asian, and other) and gender differences in the use of these therapies in the 30 days after discharge and patient adherence at 12 months after discharge, adjusting for patient baseline socio-demographic and clinical characteristics. Of 85,017 individuals, 55%, 76%, and 61% used angiotensin-converting enzyme inhibitors/angiotensin receptor blockers, [beta]-blockers, and statins, respectively, within 30 days after discharge. No marked differences in use were found by race/ethnicity, but women were less likely to use angiotensin-converting enzyme inhibitors/angiotensin receptor blockers and [beta]-blockers compared with men. However, at 12 months after discharge, compared with white men, black and Hispanic women had the lowest likelihood (almost equal to 30%-36% lower; P<0.05) of being adherent, followed by white, Asian, and other women and black and Hispanic men (almost equal to 9%-27% lower; P<0.05). No significant difference was shown between Asian/other men and white men.
Barriers to Adherence

Cognitive Decline/Dementia

Biological Factors

Cultural Factors

Health Literacy

Acculturation

Cost of Care-Giving Demands

Medication Side Effects

Cognitive Impairment

Structural Factors (Transportation, pharmacy location, neighborhood safety, perceived discrimination)
Potential Upstream Approaches

• Targeted self management programs

• Tailored CVD management neighborhood based programs; RN or other navigators

• Communication between provider teams and elderly patients/advocates groups (patient networks)
### Internet Usage Among United States Families In 2010

<table>
<thead>
<tr>
<th>Income ($)</th>
<th>Home Internet Usage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 75,000</td>
<td>87</td>
</tr>
<tr>
<td>&lt; 30,000</td>
<td>45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td>67</td>
</tr>
<tr>
<td>African American</td>
<td>56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>College Graduate</td>
<td>86</td>
</tr>
<tr>
<td>&lt; High School Graduate</td>
<td>33</td>
</tr>
</tbody>
</table>
CVD Disparity: Under-represented minority workforce
Are Race, Ethnicity, and Medical School Affiliation Associated With NIH R01 Type 1 Award Probability for Physician Investigators?

Donna K. Ginther, PhD, Laurel L. Haak, PhD, Walter T. Schaffer, PhD, and Raynard Kington, MD, PhD

Probability of NIH RO1 Award by Race and Ethnicity
<table>
<thead>
<tr>
<th>Domain(s)</th>
<th>Suggested Solution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disrupted biomedical pipeline</td>
<td>• Evaluate currently funded “pipeline” programs at all levels to assess program successes and failures</td>
</tr>
<tr>
<td>Influence of early scientific training (NIH traineeships and fellowships)</td>
<td>• Fund successful training programs and identify associated predictors of faculty career success</td>
</tr>
<tr>
<td></td>
<td>• Fund pilot programs that directly address institutional social and academic isolation for URM biomedical trainees and faculty</td>
</tr>
<tr>
<td></td>
<td>• Provision of NIH Pathway to independence awards e.g. K99/R00 for URM/Asian applicants</td>
</tr>
</tbody>
</table>
Opportunities For Future Research
1. Comprehensive characterization of chronic race-related and other stressors across the continuum of CVD

2. Expansion of understanding of how racism affects CVD health

3. Focus on intersections between race/ethnicity and sex and the interactive effect on CVD risk factor and outcome variation

4. Understand how epigenetics influences adaptive and regulatory systems by race/ethnicity

Adapted from Williams DR. Ann NY Acad Sci. 2010
5. Understand how protective factors influence CVD by race/ethnicity: social ties, religion, resilience

6. Understand the role of the recession and underemployment in patterning CVD risk

7. Implementation research and real time efforts need to take into account key factors that impact success

8. Evaluate quality of life as an outcome

Adapted from Williams DR and Leavell J. Ethnicity and Disease 2012
9. Examine interplay between brain structure and function and CVD outcome by race/ethnicity

10. Expand our understanding of health care equity beyond access (e.g. insurance) to include other determinants

11. Understanding of how traditional and non-traditional factors related to the under-represented minority science/healthcare workforce impact pipeline trajectory
CVGPS

Building the Future of Cardiovascular Research

Courtesy of Dr. Rose Marie Robertson

THE ROUTE TO PERSONALIZED CURES

Founded in Partnership with Boston University and The University of Mississippi
CVGPS Promise

Population Studies + Molecular Analysis

Sharper Subgroup Distinctions

More Effective Treatments

Rx
360° Look at Cardiovascular Health

Phenotype

Patient characteristics
- Age
- Gender
- Race

Clinical history
- Heart disease
- High blood pressure
- Diabetes

Lab values
- Cholesterol
- Blood sugar
- Cardiac proteins

Molecular Markers

- Genome
- Gene expression
- Pathways

Deeper knowledge and understanding of an individual’s CV health
CVGPS Ecosystem

Better-targeted treatments: safer, more effective

AHA and external funding
Travelling the road......

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>Black</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Completion (Class Of 2010)</td>
<td>83%</td>
<td>66.1%</td>
</tr>
<tr>
<td>Degrees Conferred To U.S. Residents (2009-2010)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate’s</td>
<td>66.3</td>
<td>13.7</td>
</tr>
<tr>
<td>Bachelor’s</td>
<td>72.9</td>
<td>10.3</td>
</tr>
<tr>
<td>Master’s</td>
<td>72.8</td>
<td>12.5</td>
</tr>
<tr>
<td>Doctorate’s</td>
<td>74.3</td>
<td>7.4</td>
</tr>
<tr>
<td>Unemployment Rate (%)</td>
<td>8.3</td>
<td>16.5</td>
</tr>
<tr>
<td>US Life Expectancy At Birth By Race And Sex 1970-2010</td>
<td>78.9</td>
<td>75.1</td>
</tr>
</tbody>
</table>


*National Center for Education Statistics.* http://nces.ed.gov/fastfacts/display.asp?id=72

Athar HM. *MMWR.* 2013

Kochanek, Kenneth D. et al. *CDC 2013*
Acknowledgements

Aryana Jacobs, BA

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Rose Marie Robertson, MD