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Secretary’s Advisory Committee on Infant Mortality
Washington, DC, November 29, 2005

Social and Environmental Factors and Disparities in Perinatal Outcomes

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Request from SACIM
Subcommittee on Health Disparities

- Relationship between social and environmental factors and infant mortality

- Role for the health sector in addressing social and environmental factors
  - Evidence-based recommendations
  - *Feasible* for HHS

- Issues of interest to the Committee
  - obesity
  - role of fathers
  - intergenerational influences,
  - beliefs/faith/resilience, role of faith based institutions
  - racism, stress and SES
Reframing the questions

• State of the Science
  – Social and environmental factors and IM
  – Health disparity causation
  – Status of evidence base for IM and disparity reduction

• Notions of *feasibility* and its potentially adverse impact on eliminating disparities

• Frameworks for disparity causation and elimination
Goal

• Development of a Roadmap to eliminating disparities in Infant Mortality

• Recommendations to the Secretary for addressing disparities in Infant Mortality
State of the Science:
I. Social and Environmental Factors and Infant Mortality

• Ecological Evidence

• Epidemiologic evidence

• Qualitative evidence
Ecological Evidence
Social Inequities and Health in the United States

Gradients in Health By SES

Disease Rate

High  Medium  Low

Socioeconomic Level
Preterm Delivery by Maternal Education and Maternal Race/Ethnicity, United States, 2000
Infant mortality rates in the United States by Education of Mother

Deaths/1000 Live births

Source: CDC/NCHS/NVSS
Epidemiologic Evidence
Established social risk factors:

Low Birth Weight Risks
- Ethnicity (African American)
- Low SES
- Single marital status
- Low education
- Poor nutritional status
- Occupational hazards and toxic exposures
- Stress

Preterm Birth Risks
- Ethnicity (African American)
- Single marital status
- Low SES

1985. Committee to Study the Prevention of LBW

Berkowittz and Papiernik 1993
Complexity in causality: multiplicity of risk

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Pop A</th>
<th>Pop B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20%</td>
<td>19%</td>
</tr>
<tr>
<td>B</td>
<td>20%</td>
<td>18%</td>
</tr>
<tr>
<td>C</td>
<td>20%</td>
<td>22%</td>
</tr>
<tr>
<td>D</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Any 3</td>
<td>5%</td>
<td>45%</td>
</tr>
</tbody>
</table>
Similar population risk prevalence; different configurations between populations: *multiple interacting risks*
Qualitative Evidence

The Question:

What is unique about the social experiences of African American women that puts them at higher risk for death and disease?
Harlem BirthRight Project

– Identified unique stressors for African American women

– Documented existence of stress in all aspects of African American women’s lives

– Documented multiple concurrent stressors among African American women
  • “Sojourner Truth Syndrome”

– Racism exacerbates other risks

Mullings and Wali, 2001:
*Stress and Resilience-the Social Context of Pregnancy in Central Harlem*
Economic and Social Hardships during pregnancy, by ethnicity  
MIHA, 2002-2003

<table>
<thead>
<tr>
<th>Hardship</th>
<th>African American</th>
<th>Anglo</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; Poverty</td>
<td>44.7</td>
<td>14.9</td>
</tr>
<tr>
<td>Hard to make ends meet</td>
<td>22.4</td>
<td>10.7</td>
</tr>
<tr>
<td>Food insecurity</td>
<td>19.3</td>
<td>10.4</td>
</tr>
<tr>
<td>Food insecurity and hunger</td>
<td>7.3</td>
<td>3.3</td>
</tr>
<tr>
<td>No practical support</td>
<td>10.2</td>
<td>6.2</td>
</tr>
<tr>
<td>No emotional support</td>
<td>7.2</td>
<td>3.9</td>
</tr>
<tr>
<td>Separated or divorced</td>
<td>16.4</td>
<td>4.6</td>
</tr>
<tr>
<td>Homeless</td>
<td>7.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Involuntary job loss</td>
<td>14.2</td>
<td>6.8</td>
</tr>
<tr>
<td>Partner job loss</td>
<td>16.9</td>
<td>11.0</td>
</tr>
<tr>
<td>Incarceration of partner</td>
<td>10.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Domestic Violence</td>
<td>5.8</td>
<td>1.8</td>
</tr>
<tr>
<td>1-5 hardships</td>
<td>70.0</td>
<td>39.0</td>
</tr>
</tbody>
</table>

*Source: Braverman P. (Center on Social Disparities in Health, UC-SF))
Presented at Jacobs Institute of Woman’s Health Conference, May 2005*
Braverman Analysis

Summary Findings:
California Maternal and Infant Health Assessment (MIHA)

- All ethnic age and income groups experience hardships.
  - Major economic and social hardships are not rare during pregnancy

- Black, Latina, and Native American women suffer more hardships than white women

- Poor and near poor women suffered more hardship than women >200% poverty

- 53% births in California were to women who were poor or near poor
Multiple Risks and Growth Retardation (SGA)

Source: PRAMS

<table>
<thead>
<tr>
<th>Number of Risks</th>
<th>Adjusted OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Reference group</td>
</tr>
<tr>
<td>1</td>
<td>1.29</td>
</tr>
<tr>
<td>2</td>
<td>1.86</td>
</tr>
<tr>
<td>3</td>
<td>1.67 (NS)</td>
</tr>
<tr>
<td>4</td>
<td>2.06</td>
</tr>
<tr>
<td>5</td>
<td>3.53</td>
</tr>
<tr>
<td>6+</td>
<td>3.82</td>
</tr>
</tbody>
</table>

Ahluwalia, Merritt et al, Obstet and Gynec, 2001

<table>
<thead>
<tr>
<th>Risk Index</th>
<th>Prevalence of Risk (%) Black Women</th>
<th>Prevalence of Risk (%) White Women</th>
<th>% Preterm Birth (Crude) Black Women P = 0.748</th>
<th>% Preterm Birth (Crude) White Women P = 0.581</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero risks</td>
<td>220 (10.19)</td>
<td>24 (7.38)</td>
<td>14.41</td>
<td>10.53</td>
</tr>
<tr>
<td>Any One Risk</td>
<td>591 (27.37)</td>
<td>89 (27.38)</td>
<td>12.50</td>
<td>3.28</td>
</tr>
<tr>
<td>Any Two Risks</td>
<td>745 (34.51)</td>
<td>112 (34.46)</td>
<td>14.10</td>
<td>10.23</td>
</tr>
<tr>
<td>Any Three Risks</td>
<td>480 (22.23)</td>
<td>83 (25.54)</td>
<td>16.29</td>
<td>7.02</td>
</tr>
<tr>
<td>All Four Risks</td>
<td>123 (5.70)</td>
<td>17 (5.23)</td>
<td>13.92</td>
<td>5.88</td>
</tr>
</tbody>
</table>

E Taylor, V Hogan, J Culhane, 2003; unpublished

*Stress, BV, smoking or poverty
Social Determinants of Health

- Income
- Wealth
- Racism
- Stressful experiences (chronic)
- Resource limitations
- Social capital
- Housing quality and availability

- Employment security
- Food security
- Social exclusion
- Language barriers
- Working conditions
- Education
- Early childhood care
- Legislation, regulations
Social Environment

- The organization of the home we live in
- The connections we have to other people
- The neighborhood in which we live
- Organization of our workplace (or school)
- Our level of access to goods, services and resources of society
- The built environment that surrounds us
- Socioeconomic status
- The way others in society treat us; the amount of power and/or control others have over us
- The dominant political ethos/environment
Historical experiences of slavery, segregation, discrimination created economic and environmental disparities

- Median family income for Blacks and Hispanics < $28K, Whites and Asians > $45K
  (Census, 1990)

- Net wealth: Blacks $4,418, Whites $45,740
  (Eller and Fraser 1995)

- Blacks more likely to live in low-income, segregated areas-”concentration of risk”; residential segregation implies restriction in options for mobility
<table>
<thead>
<tr>
<th>Home ownership, 2000</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>White</strong></td>
<td><strong>Black</strong></td>
</tr>
<tr>
<td>73%</td>
<td>48%</td>
</tr>
</tbody>
</table>
• In US, **no state** offers a minimum wage sufficient for a family with 1 FTE worker with enough earnings to afford a 2 bedroom apartment (at rent 30% income)

• **24 states** do not offer a minimum wage sufficient for a family with 2 FTE workers with enough earnings to afford a 2 bedroom apartment (at rent 30% income)

• There is a 3.3 million unit shortfall in housing for low income families
• 17% African Americans (in metro areas) live in extreme poverty

• 1.4% Whites (in metro areas) live in extreme poverty

_Census, 1990_
Environment and Racism


Racism in Society

• **How does racism operate?**
  – It provides privileges to some white people that are not available to black people
    • *These privileges buffer against stress*
    • *These privileges provide resources to protect health*
  – It denies black people of opportunities to improve life
    • *Redlining and controlling where you can live*
  – It fails to undo the effects of the past social injustices creating disparities
    • *Assault on affirmative action in education*
  – It fails to act in the face of need for whole groups of black folks
    • *Tuskegee*
    • *HIV*
    • *BV and PTB*
    • *Impoverished neighborhoods (New Orleans as an example)*
  – It provides inferior resources to black folks
Percent of Philadelphia Childbearing Women with a Shelter Episode: By Race/Ethnicity, Education, and Parity

Parity by Years of Education by Race

5 Year Prevalence Rate

0 1 2,3 4+

<11 12+ <11 12+ <11 12+
Black White Latina

Parity by Years of Education by Race
Percent Preterm Births by Tax Delinquency Ratio of 20: 1990 to 1998 by Block Group

% < 37 weeks gestation

% overdue property taxes > 20% of Market Value

% of 20: 1990 to 1998 by Block Group
Neighborhood level factors (e.g. assault rate, homeless rate, neighborhood condition, etc..) account for a large portion of the observed race/ethnic differences in BV during pregnancy. These (neighborhood factors) account for a greater portion than individual behavioral factors.

Conceptual Models and Biologic Mechanisms

How does income and other social experience translate into adverse biologic and physiologic phenomenon?
Pathways from SES to Adverse Health
Model: SES and Health Pathway
Adler and Ostrove, 1999
(modified by Hogan)

SES
- Education
- Occupation
- Income

Environmental Resources and Constraints:
- External environ
- Social environ
- Resources

Psych. Influences
- Affect
- Cognition

Exposure to carcinogens and pathogens
Access to Health care
Performance of health relevant behaviors
CNS & endocrine response
Immune & CV change

A B C D E F
Race SES Education Occupation Income Exposure to carcinogens and pathogens Access to Health care Performance of health relevant behaviors CNS & endocrine response Immune & CV change
Stress as Biologic Mediator

housing problems
role strain
racism

neuro-endocrine changes

immuno-suppression

JF Culhane, 2001
Summary: SES and Health

- Consistent Ecologic evidence

- Consistent Epidemiologic evidence
  - Higher risk for adverse social conditions
  - Higher distribution of adverse social conditions for African Americans

- Qualitative evidence documents unique experiences, allows generation of hypotheses

- Valid Conceptual Models

- Valid Biologic mediators
What don’t we know?

- ▶️ A → B: Evidence of differential dx by phenotype
- ▶️ A → F: Evidence of higher risk of IM if non-white
- ▶️ B → F: Evidence of higher risk of IM if adverse social positioning
- ▶️ *A → C: Some evidence, measures not always well specified contextually, not spec. to IM as outcome
- ▶️ A → D: Some evidence, not spec. to IM
- ▶️ C → D → F: No. Some emerging evidence

Refer to modified Adler Model
The key is to identify the research needed to inform appropriate intervention

– whether or not the intervention is do-able by HHS and public health agencies alone

– even if the research suggests changing social conditions
State of the Science:
II. Health Disparities 101
Disparity

“differences in the incidence, prevalence, mortality and burden of diseases and other adverse health conditions that exist among specific population subgroups in the US”. (NIH)
Cause-Specific Infant Mortality Rates
By Maternal Ethnicity, United States, 2002

Source: 2002 Period Linked Birth/Infant Death Data Set (CDC/NCHS)
Rate of Singleton PTD by Maternal Race/Ethnicity, United States, 1989-1997
Infant Mortality Rates Due to SIDS, United States by race, 1973-1998*

*Preliminary Data
• Reducing the disease does not = reducing the disparity

• Reducing disparity may require different actions above and beyond risk/prevention models
Disparity: Contributing factors

- Health care
- Behavior*
- Culture
- Social factors
- Environmental factors
- “Weathering”
- Racism

- Genes*
- Economic factors
- Neighborhood factors
- National, state or local Policies
- Stress

* Not shown to be consistent contributor across all diseases

(Kington and Nickens) in: America Becoming: Racial Trends and their Consequences,
National Academy Press, 2000
To what degree do different factors contribute to health disparities?

*Is it this?*

**Simulation 1: % Contribution to health disparity**

- Health care: 42%
- Behaviors: 10%
- Racism: 5%
- Poverty: 15%
- Genes: 10%
- Other: 3%
- Culture: 10%
- Environment: 5%
- Behaviors: 10%
- Health care: 42%
To what degree do different factors contribute to health disparities?

Or this?

Simulation 2: % Contribution to Health Disparity

- health care: 3%
- behaviors: 20%
- culture: 15%
- environment: 15%
- racism: 15%
- poverty: 25%
- genes: 1%
- other: 6%

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To what degree do different factors contribute to health disparities?

Or this?
“The causes of health disparities are multiple. They include poverty, level of education, inadequate access to medical care, lack of health insurance, societal discrimination and lack of complete knowledge of the causes, treatment and prevention of serious diseases affecting different populations. The causes {of health disparities} are not genetic, except in rare diseases like sickle cell.......Eliminating health disparities will require a cross-cutting effort, involving not only various components of the Federal government, but the private sector as well...
“...racial and ethnic disparities in health status largely reflect differences in social, socioeconomic, behavioral risk factors and environmental living conditions. Health care is therefore necessary but insufficient in and of itself to redress racial and ethnic disparities in health status. A broad and intensive strategy to address social-economic inequality, concentrated poverty, inequitable and segregated housing and education...individual risk behaviors as well as disparate access to medical care is needed to seriously address racial and ethnic disparities in health status”
The Circles of Influence on Health

Summary: Health Disparity Science

- Social factors are largest contributors

- Need to re-evaluate logic of full focus on individual behavior, genetic, and health care factors to eliminate disparities

- Need different efforts above and beyond evidence-based disease reduction to eliminate disparity

- Causal contributors are complex and interacting.
State of the Science:
III. Infant Mortality and Preterm birth reduction
How Does an Evidence Base Get Developed?
Development of Evidence-based Strategies

or “How a bill becomes a law “in Public health

**Communities identify disparities,**

**Generating ideas for action**

**Strategies evaluated**

**Promising strategies are funded**

**Communities identify disparities,**

**Generating ideas for action**

**Process implementation perfected**

**Evaluation published**

**Professional synthesis and review of literature**

**Evidence-based Strategies to Eliminate disparities**

**BASIC SCIENCE/RESEARCH**

• Community factors,
• Racism and health mechanisms
• SES & health mechanisms
• Measurement issues
• Other methods

**COMMUNITY/POPULATION-BASED INTERVENTION**
Summary

• Established evidence base guiding intervention does not exist for all infant mortality causes

• Evidence base does not exist for interventions to eliminate disparity in preterm birth
  – ex. : BV, PTB and African American women

• Need to develop an evidence base
  – Support research on largest contributors
“Through the Finding Answers: Disparities Research for Change program, researchers at the University of Chicago will award and manage research grants totaling $5 million to organizations implementing and evaluating interventions aimed at reducing disparities. With this pool of funds, project leaders hope that health plans, hospitals, and community clinics will be encouraged to focus on racial and ethnic disparities as a priority in their quality improvement agendas. Led by Marshall H. Chin, M.D., M.P.H., associate professor of medicine, the team will also seek to inform the field about best practices going on with respect to quality improvement strategies specifically targeted at reducing racial and ethnic disparities. Finding Answers is likely to focus on evaluating interventions in treatment areas where the evidence of racial and ethnic disparities is strong and the recommended standard of care is clear. Therefore, innovations in the treatment of cardiovascular disease, depression, and diabetes are strong possibilities for research funds.”
On the Notion of "Feasibility"

Limitations in defining action by HHS, public health and medicine
Relative Pattern Match

How important is the factor in health disparities?

How likely is it that the factor can be changed?

Hogan et al. Roadmap to Health Disparities Project, CDC Concept Map, 2001
Summary

• Reliance on feasibility of action need to be reassessed by HHS
  – Reframe as “how do we make the necessary actions more feasible?”

• Need to take scientific approach to elimination of disparities in Infant mortality

• HHS and public health agencies need to partner with entities for whom social change is feasible
  – Communities
  – Other gov’t agencies
  – Advocates
Frameworks for Research and Action

• How do we assess *which* factors contribute to the disparity?

• How do we prioritize factors to get at the ones that contribute the *most*?
Factors of Interest to SACIM Members

- obesity
- role of fathers
- intergenerational influences
- beliefs/faith/resilience
- role of faith based institutions
- racism, stress and SES
Logic Model
Determining Contributors to PTB Disparity

Is factor associated with PTB?

YES

Factor differentially distributed between vulnerable group and comparison population?

YES

Higher prevalence in select vulnerable group?**

YES

Probably a contributor to PTB Disparity

NO

NO

NO

NO

NO

NO

NO

Factor makes subject more vulnerable to risk or limits access to protection?*

YES

Factor is protective but is equally unavailable; one pop’n group more likely to be affected b/c of higher prevalence of related risk***

YES

Probably not a contributor to PTB Disparity

NO

NO
Logic Model:
Planning Strategies to Eliminate PTB Disparities

Contributors to PTB Disparity

What is relative % contribution to PTB disparity?

High

Feasibility of Change*

High

Immediate Priority for action

Determine steps to increase feasibility; act to develop evidence base

Low

Feasibility of Change*

High

Assess resource input /effect ratios and adjust**

Do Not Act***

Low
Recommendations

1. Promote a rigorous scientific approach to studying and addressing disparities
2. Support systematic development of evidence base for disparity elimination
3. Establish well funded “Roadmap”- like interdisciplinary projects to develop evidence base for addressing social determinants of disparity
   - Partner with other Federal agencies (e.g. Education, Justice, HUD) to fund
Recommendations to Health Disparity Subcommittee

Key Challenge:

To address social conditions—how does a health agency effect changes in social arena?

Recommendation for Approach:

- Study and critically evaluate examples of successful intervention trials to address social determinants; publish results.
  - Synthesize what works, what does not
  - Identify process of development
  - Identify key components
  - Include characteristics of what works in RFA’s for intervention trials
Examples to Study

- Active Living by Design (RWJF)
- MTO (Moving to Opportunity)
- NYC: Asthma and Housing Conditions (NCEH)
- Environmental Justice Initiatives
- Lead Abatement Programs
- Sanagachi Project (India)
- New Deal for Communities (NDC) (Great Britain)
Why These?

- Multi-level
- Address social or environmental determinants
- Positive evaluations (some)
- Conceptual validity
- Much to learn from successes and failures in the process