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Secretary's Advisory Committee on Infant Mortality
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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

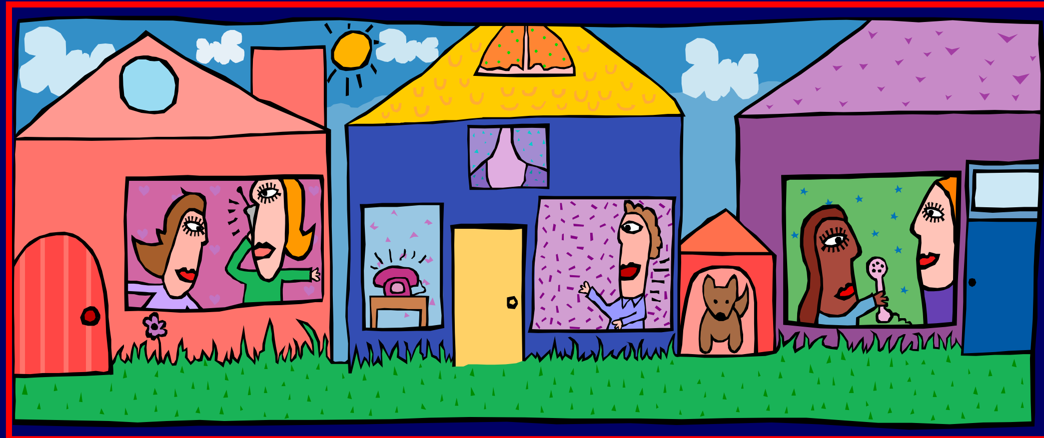
Goal

- Development of a Roadmap to eliminating disparities in Infant Mortality
- Recommendations to the Secretary for addressing disparities in Infant Mortality

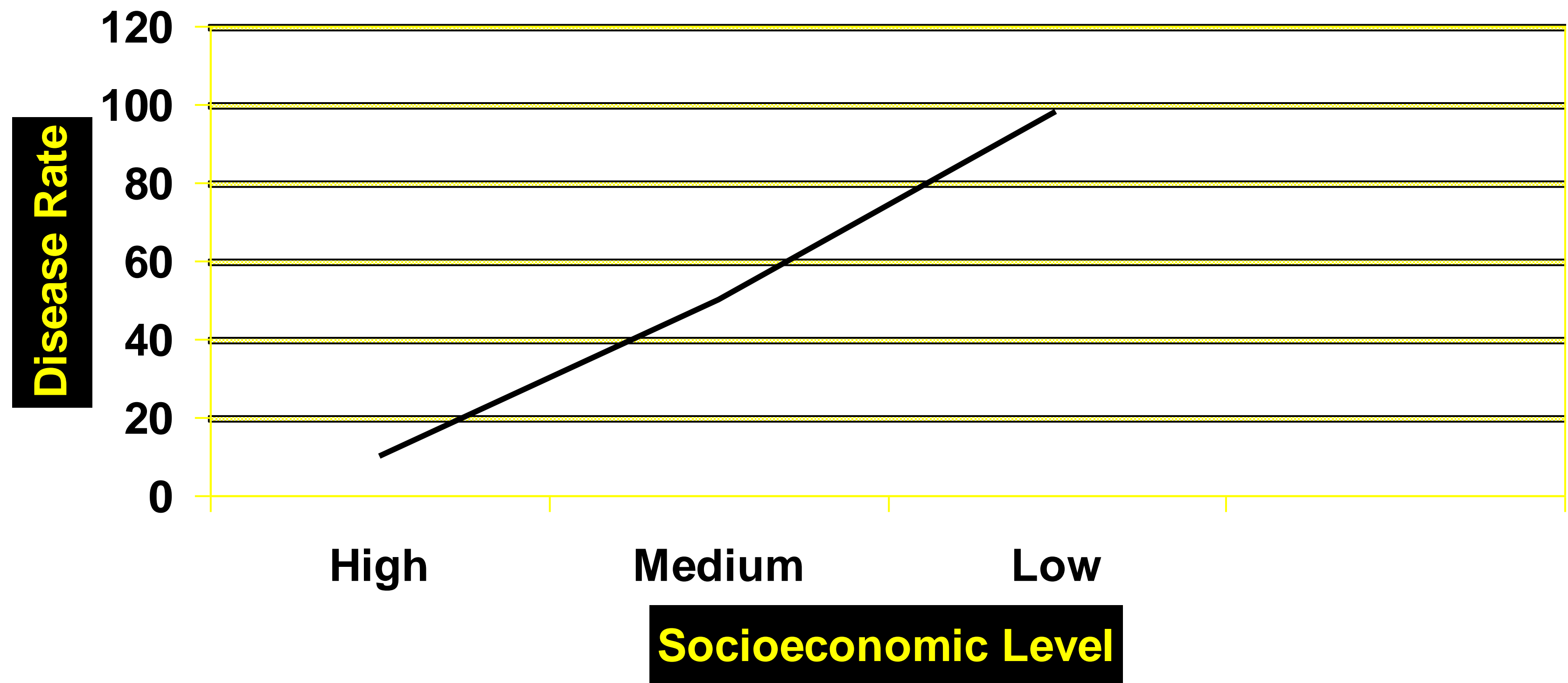
State of the Science:
I. Social and Environmental Factors and Infant Mortality

- Ecological Evidence
- Epidemiologic evidence
- Qualitative evidence

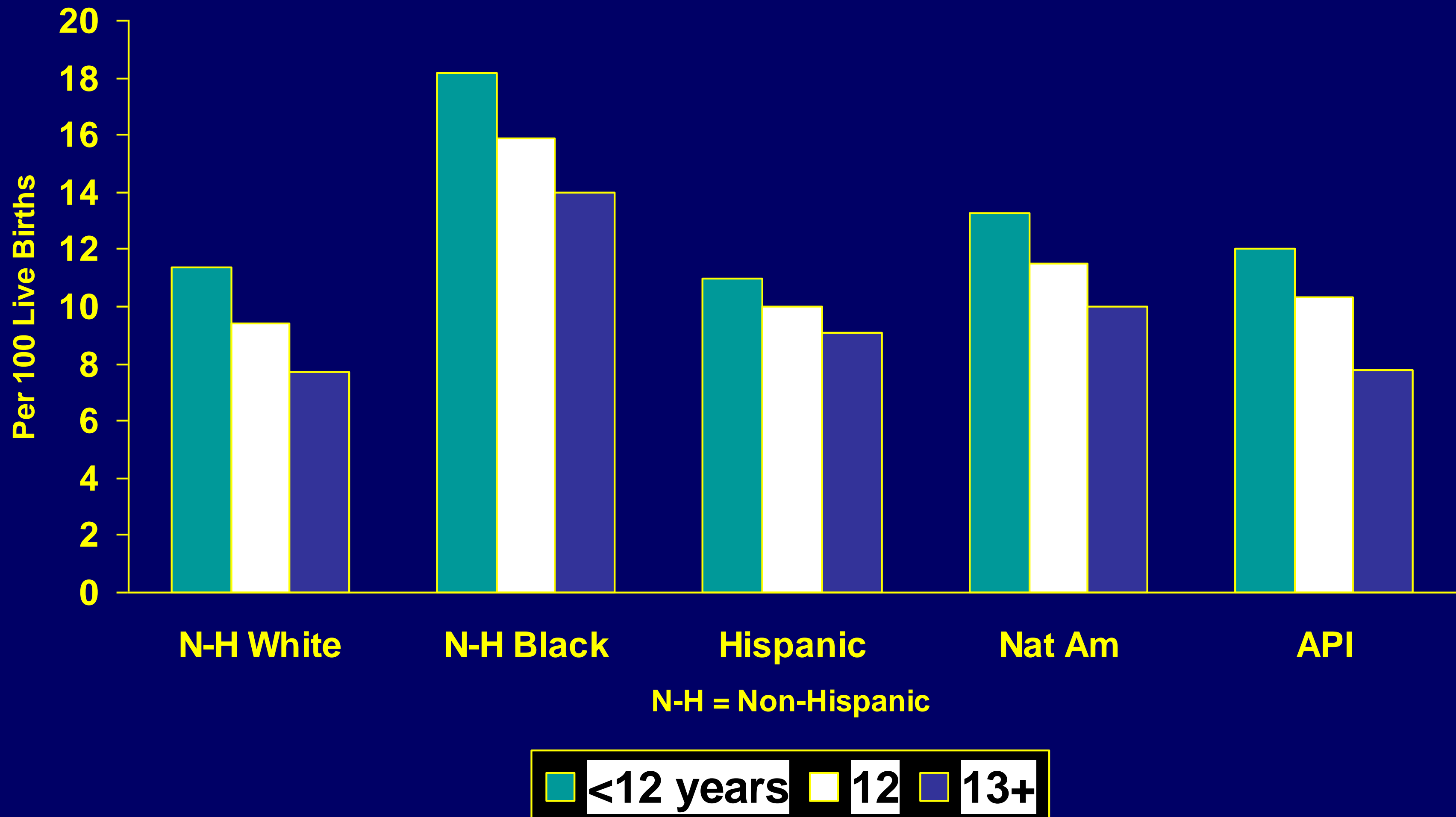
Ecological Evidence



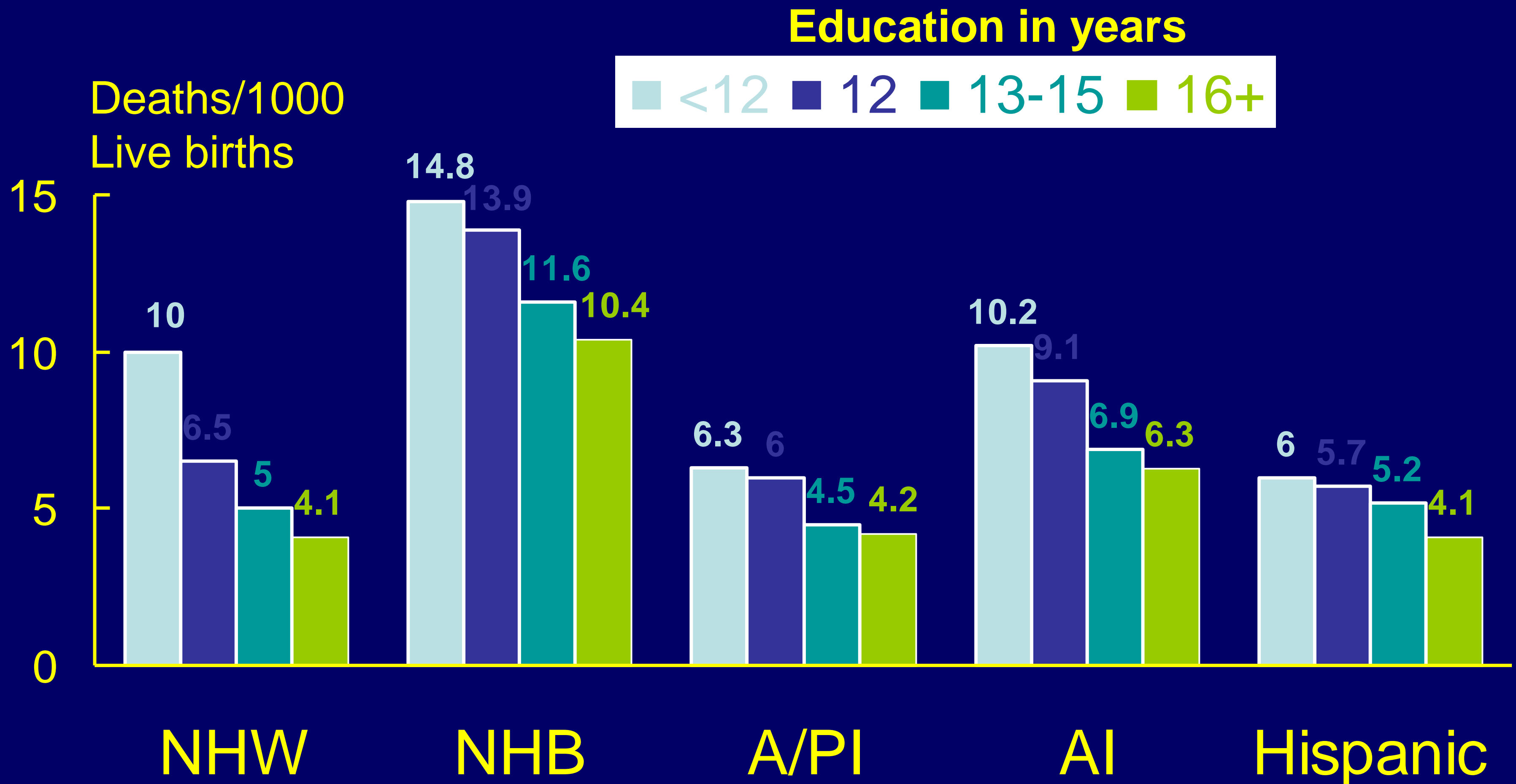
Social Inequities and Health in the United States



Preterm Delivery by Maternal Education and Maternal Race/Ethnicity, United States, 2000



Infant mortality rates in the United States by Education of Mother



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

1985. Committee to Study the Prevention of LBW

Preterm Birth Risks

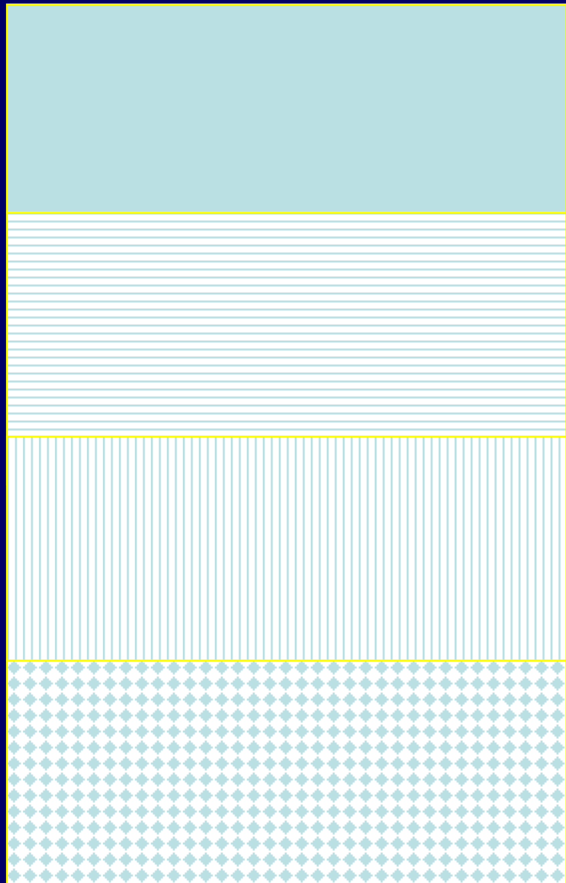
- Ethnicity (African American)
- Single marital status
- Low SES

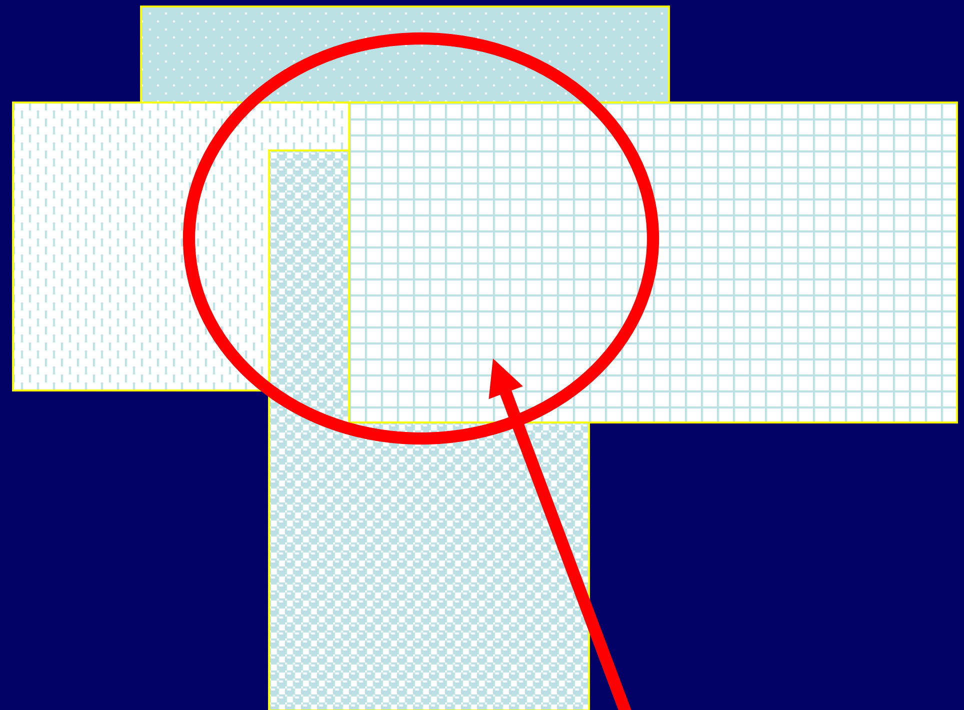
Berkowittz and Papiernik 1993

Complexity in causality: multiplicity of risk

Risk Factor	Prevalence Pop A	Pop B
A	20%	19%
B	20%	18%
C	20%	22%
D	10%	10%
Any 3	5%	45%

Similar population risk prevalence; different configurations between populations: *multiple interacting risks*





Subpopulation of B
with multiple overlapping risks

Population B

Population A

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

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

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

Number of Risks	Adjusted OR
0	*Reference group*
1	1.29
2	1.86
3	1.67 (NS)
4	2.06
5	3.53
6+	3.82

Ahluwalia , Merritt et al, Obstet and Gynec, 2001

Prevalence of Preterm Birth Stratified by Multiple Risks* and Ethnicity. SPEAC Study, (Philadelphia, PA) 1999-2001.

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

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**

Home ownership, 2000

White	Black
73%	48%

- 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

- Morland K, Wing S, Diez Roux A, Poole C. (2002) **Neighborhood characteristics associated with the location of food stores and food service places**. American Journal of Preventive Medicine. 22(1):23-9.

- Morrison RS, Wallenstein S, Natale DK, Senzel RS Huang L (2000) “We don’t carry that” – Failure of pharmacies in predominantly non-white neighborhoods to stock opioid analgesics. New England Journal of Medicine 342:1023-1026

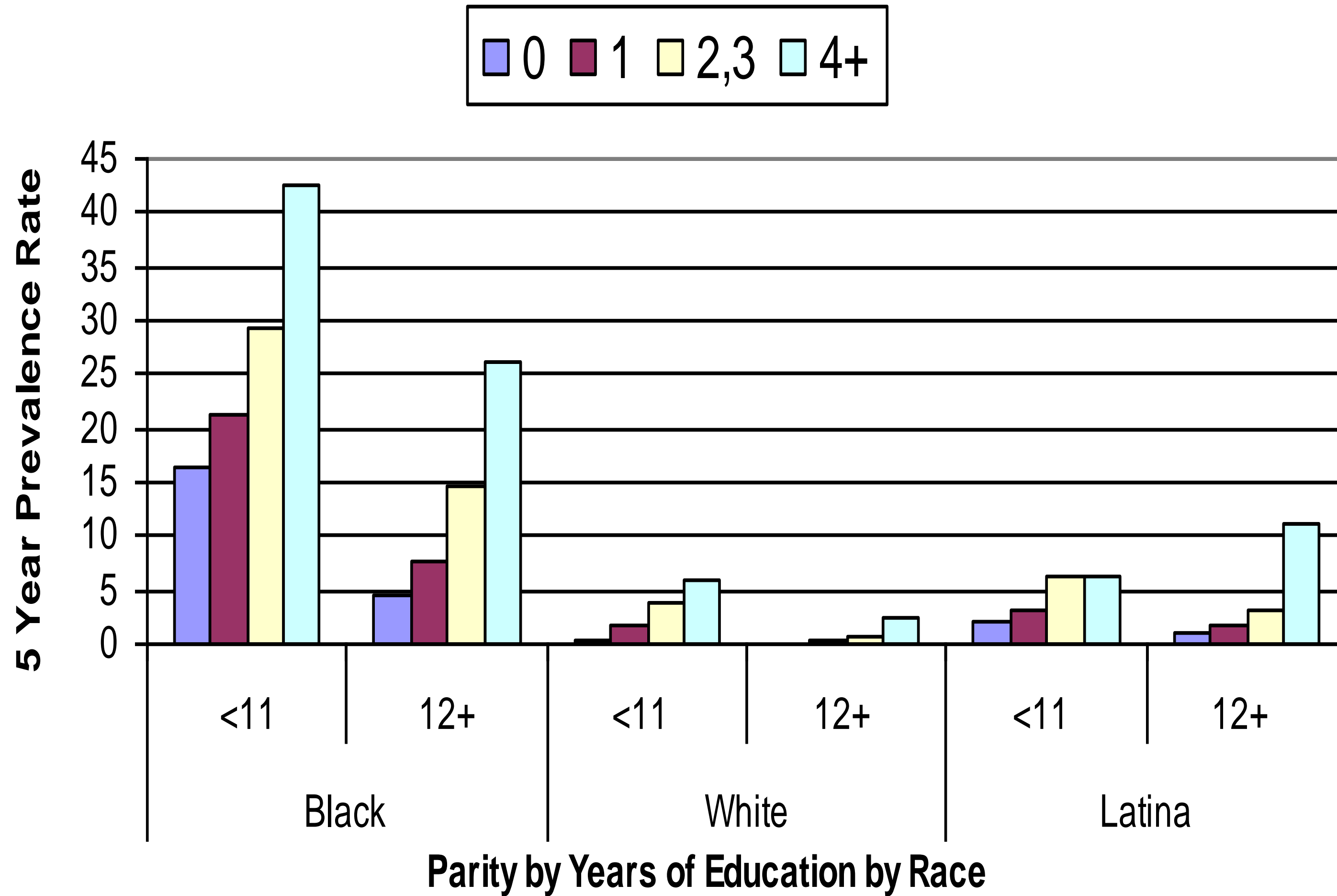
- Bullard, R.D. (1983) **Solid waste sites and the black Houston community**. Sociological Inquiry 53(2/3) 273-288

- LaVeist TA, Wallace JM Jr. (2000) **Health risk and inequitable distribution of liquor stores in African American neighborhood**. Social Science and Medicine Aug;51(4):613-7.

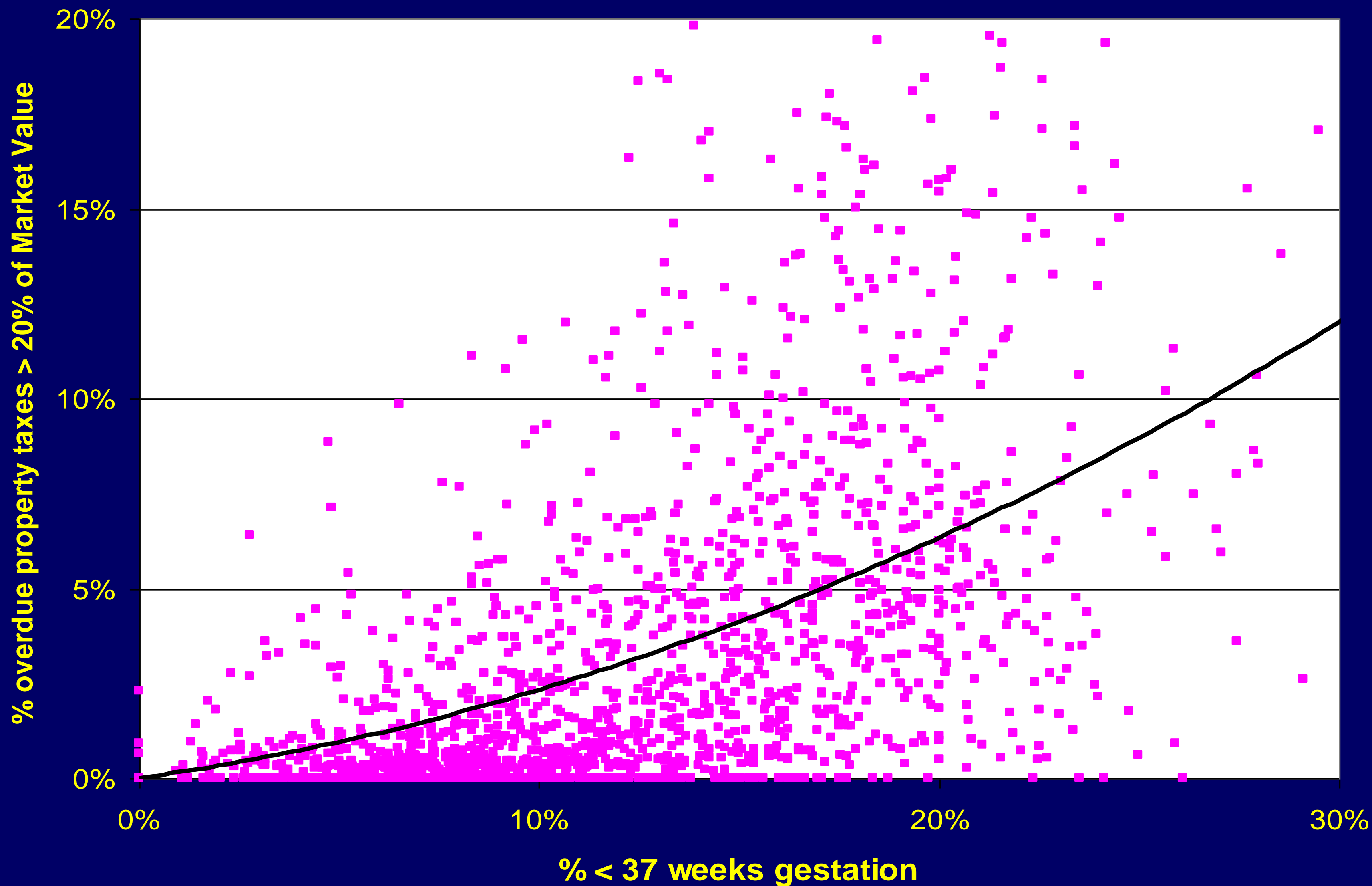
Racism in Society

- **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
    - *Tuskeegee*
    - *HIV*
    - *BV and PTB*
    - *Impoverished neighborhoods (New Orleans as an example)*
  - It provides inferior resources to black folks

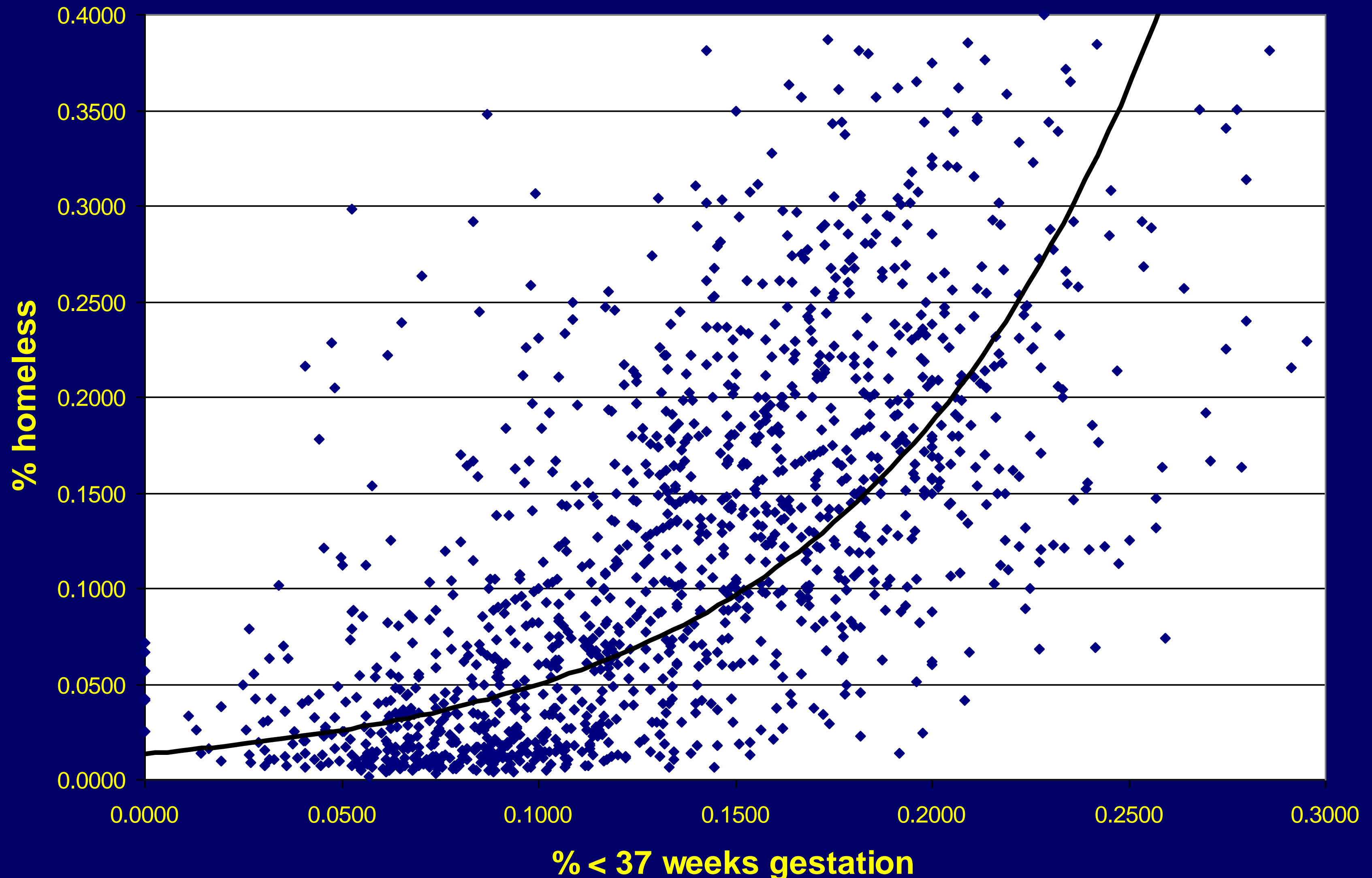
Percent of Philadelphia Childbearing Women with a Shelter Episode: By Race/Ethnicity, Education, and Parity



Percent Preterm Births by Tax Delinquency Ratio of 20: 1990 to 1998 by Block Group



Percent Births to Ever Homeless Women by Percent Preterm: 1990 to 1998 by Block Group



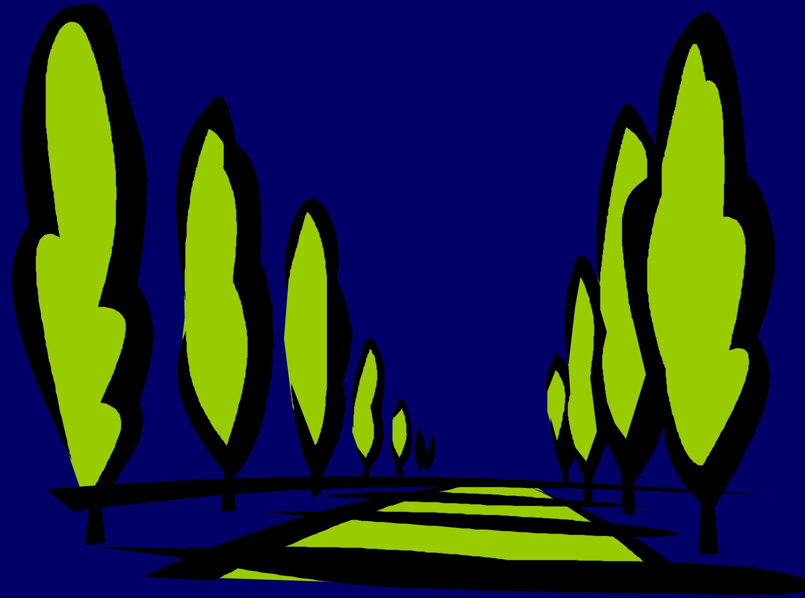
Neighborhood level factors (*e.g. assault rate, homeless rate, neighborhood condition, etc*..) account for a large portion of the observed race/ethnic differences in BV during pregnancy. These (*neighborhood factors*) account for a greater portion than individual behavioral factors.

Culhane, J. F.,Rauh, V.,McCollum, K. F.,Elo, I. T, Hogan, V.
Exposure to chronic stress and ethnic differences in rates of bacterial vaginosis among pregnant women . American Journal of Obstetrics & Gynecology 187(5) : 1272-6. 2002

Conceptual Models and Biologic Mechanisms

How does income and other social experience translate into adverse biologic and physiologic phenomenon?

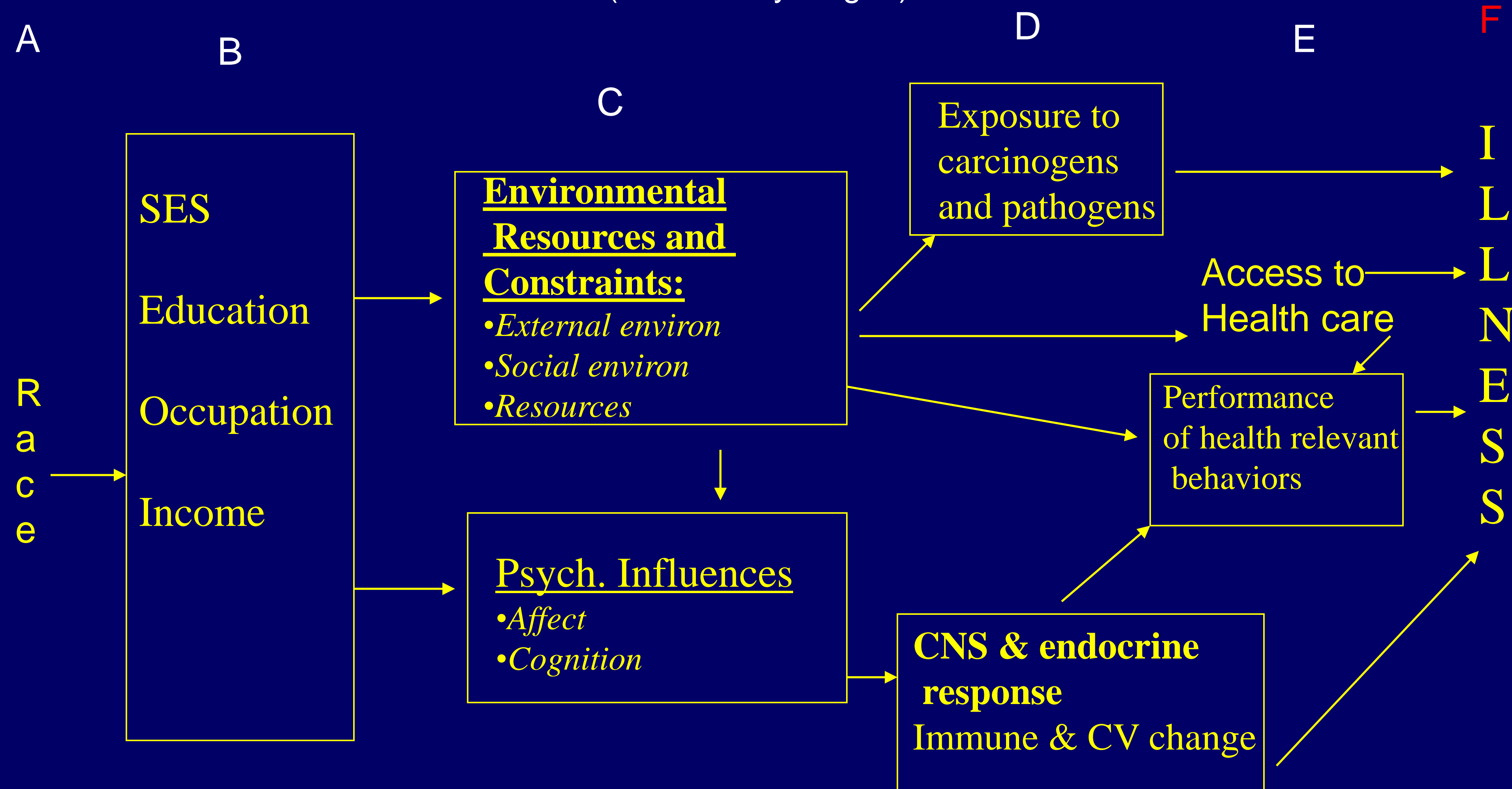
Pathways from SES to Adverse Health



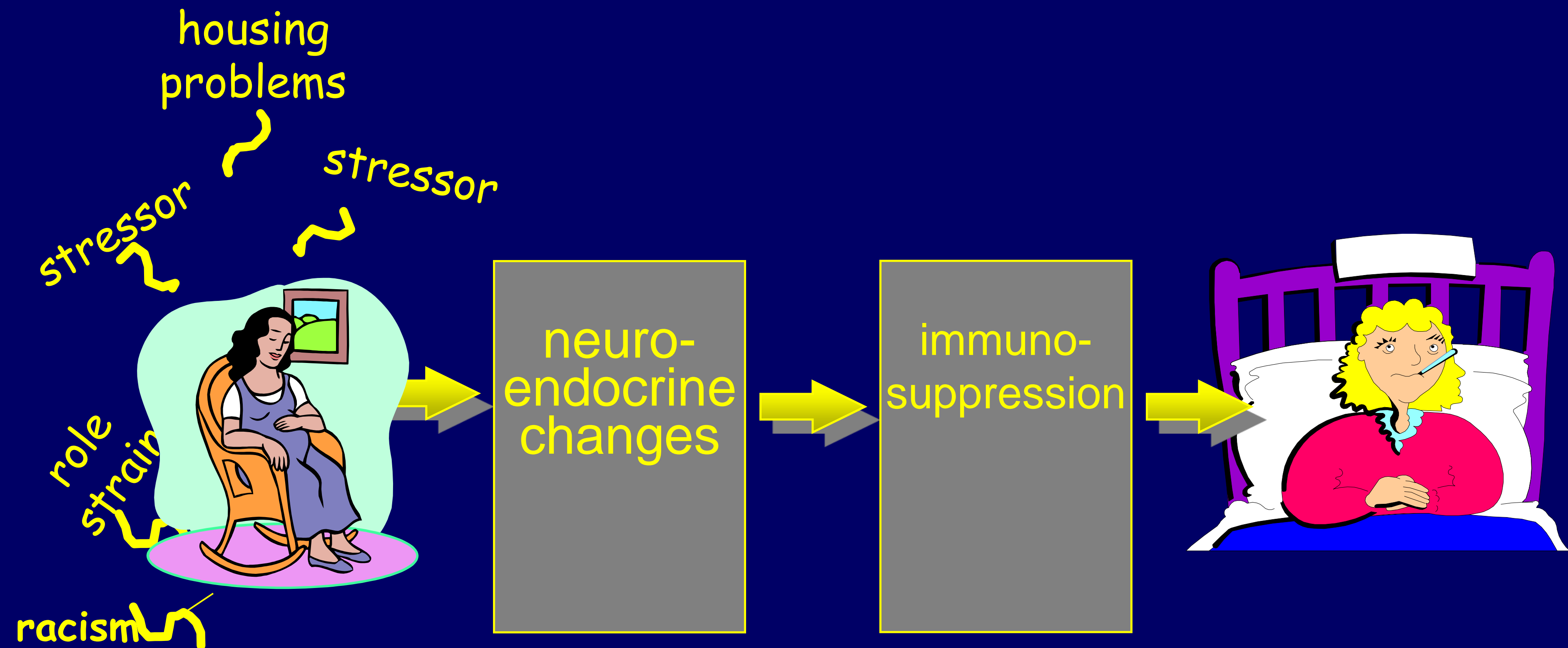
Model: SES and Health Pathway

Adler and Ostrove, 1999

(modified by Hogan)



Stress as Biologic Mediator



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

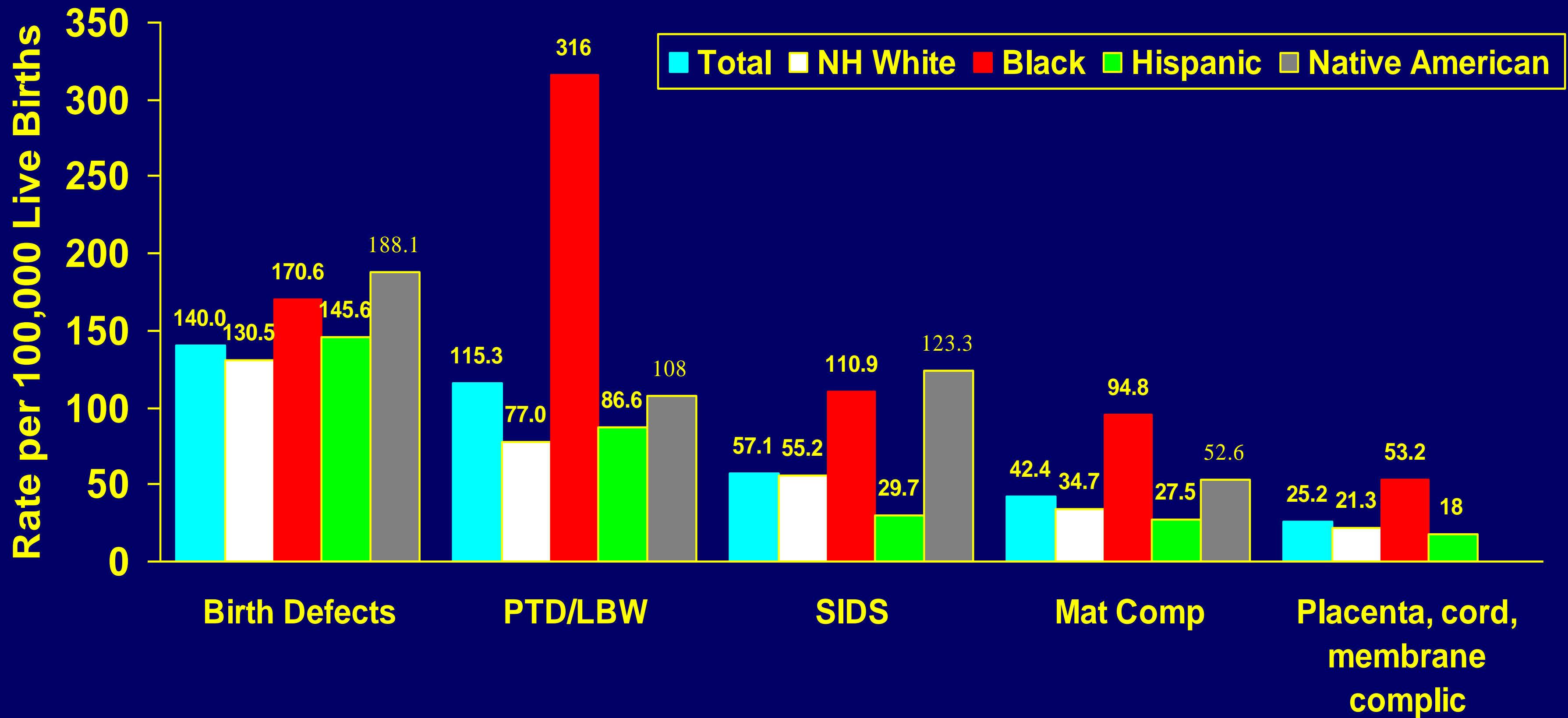
State of the Science:

II. Health Disparities 101

Disparity

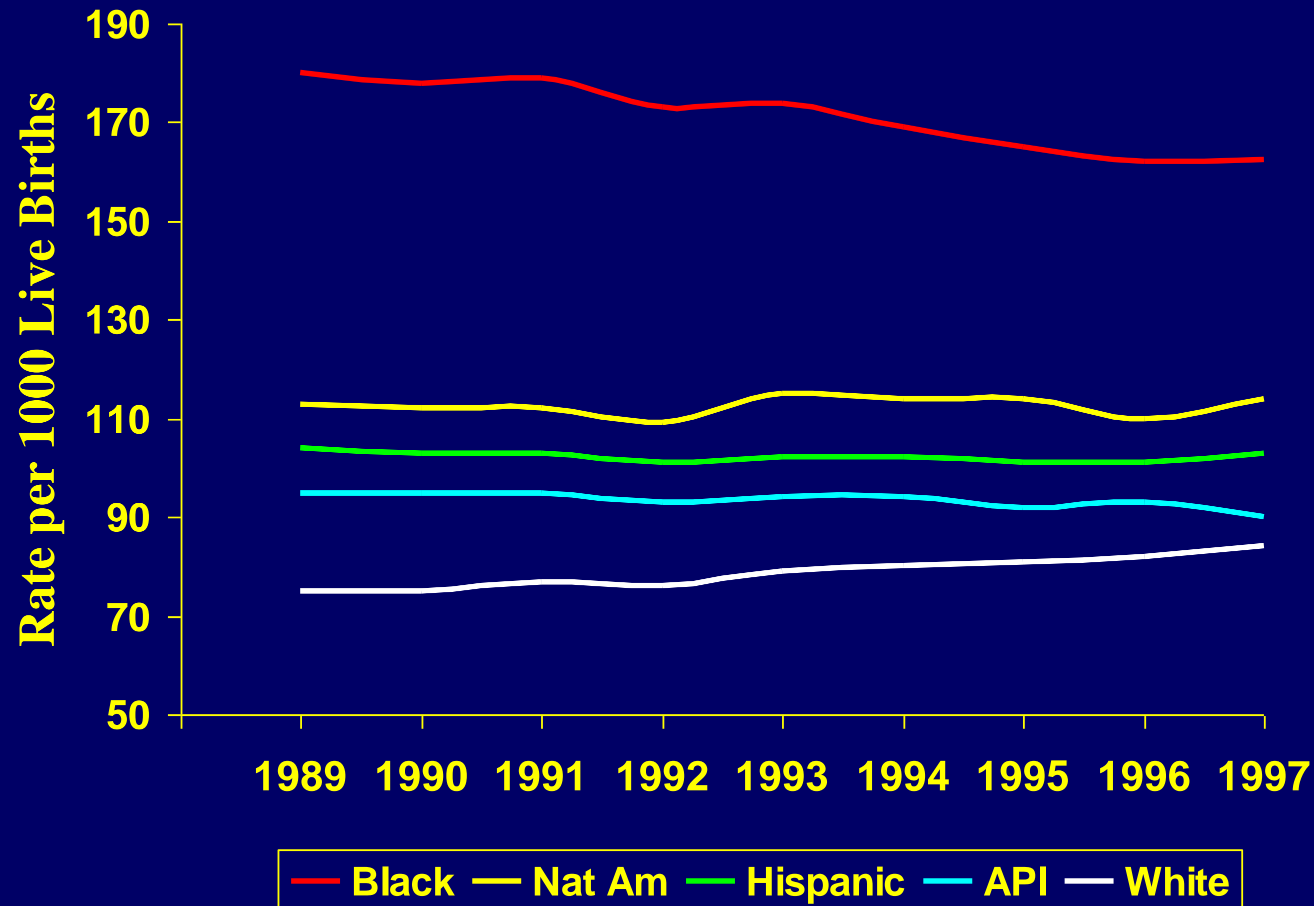
"differences in the incidence, prevalence, mortality and burden of diseases and other adverse health conditions that exist among specific population subgroups in the US". (NIH)

Cause-Specific Infant Mortality Rates By Maternal Ethnicity, United States, 2002

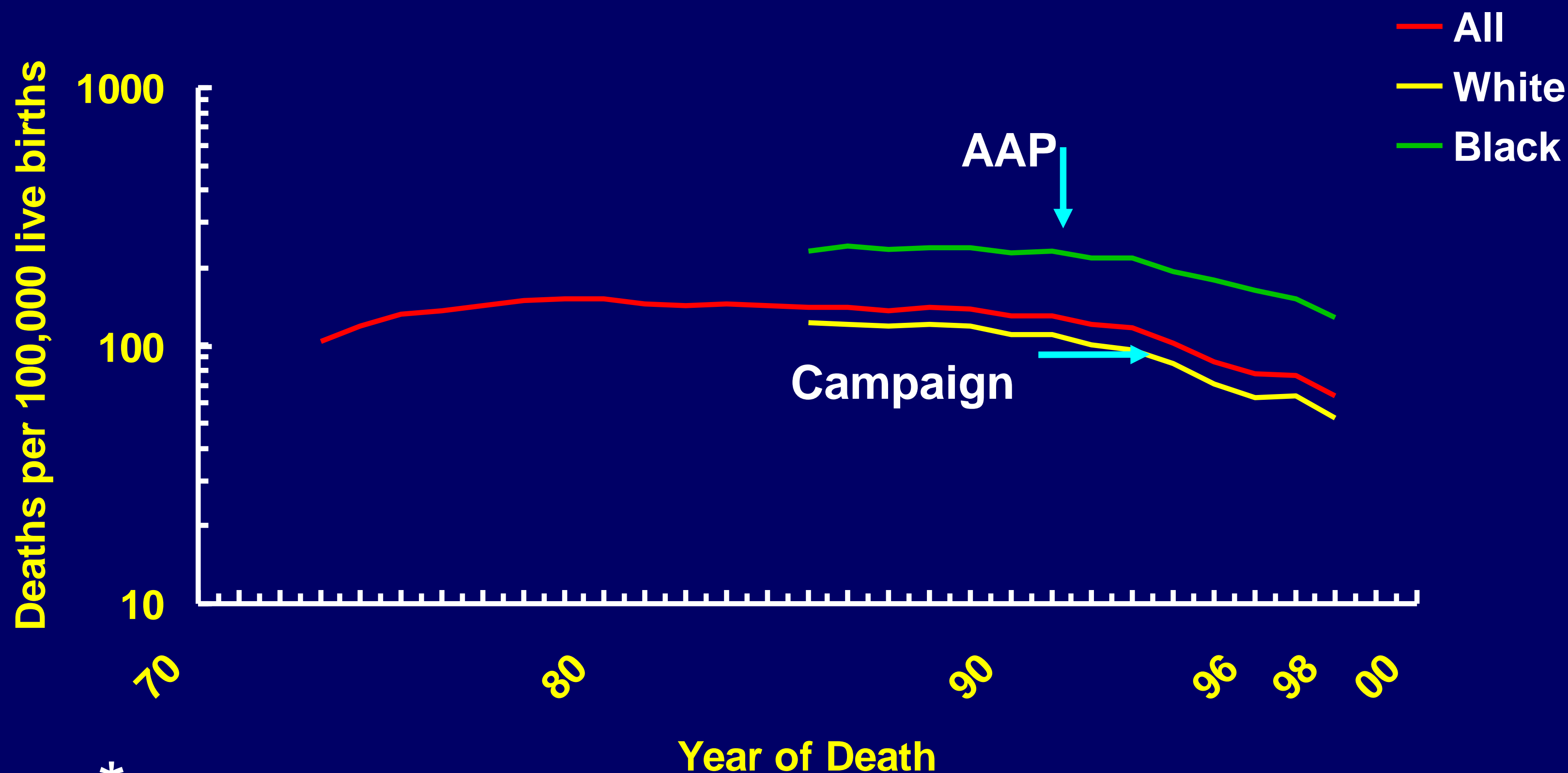


Source: 2002 Period Linked Birth/Infant Death Data Set (CDC/NCHS)

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

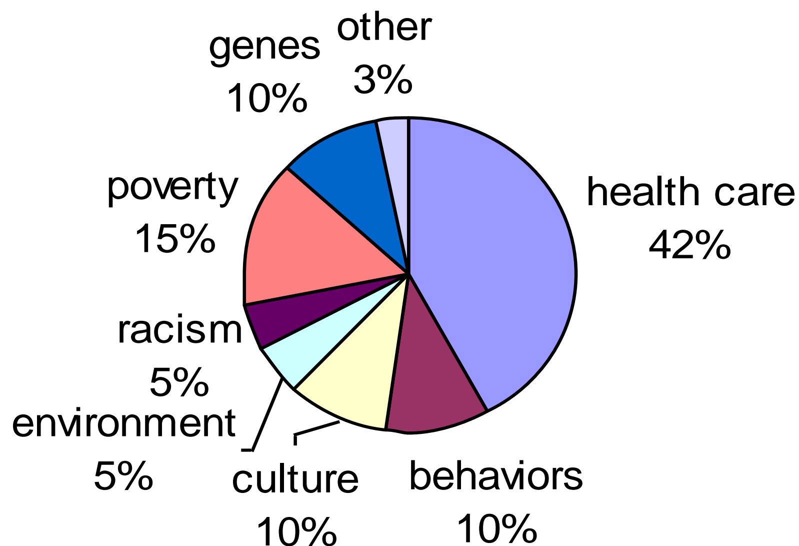
- Genes*
- Economic factors
- Neighborhood factors
- National, state or local Policies
- Stress

* *Not shown to be consistent contributor across all diseases*

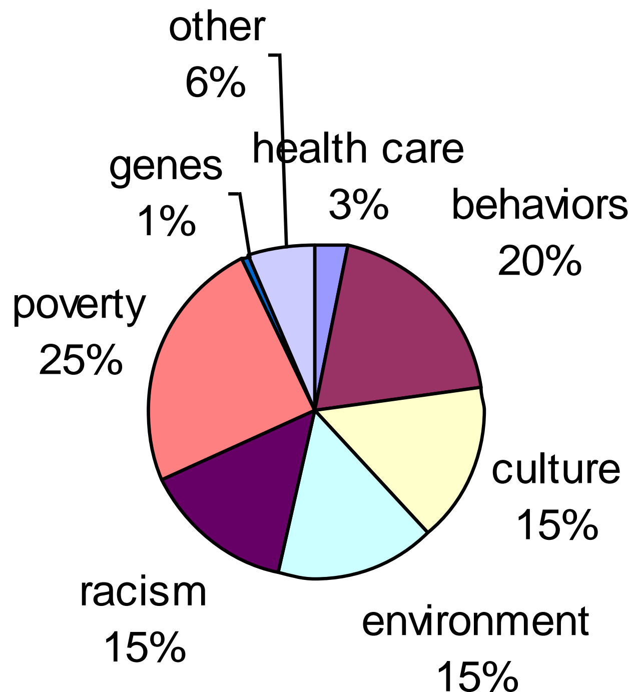
(Kington and Nickens)
in: America Becoming: Racial Trends and their Consequences,
National Academy Press,2000

To what degree do different factors contribute to health disparities?

Is it this?



To what degree do different factors contribute to health disparities?
Or this?



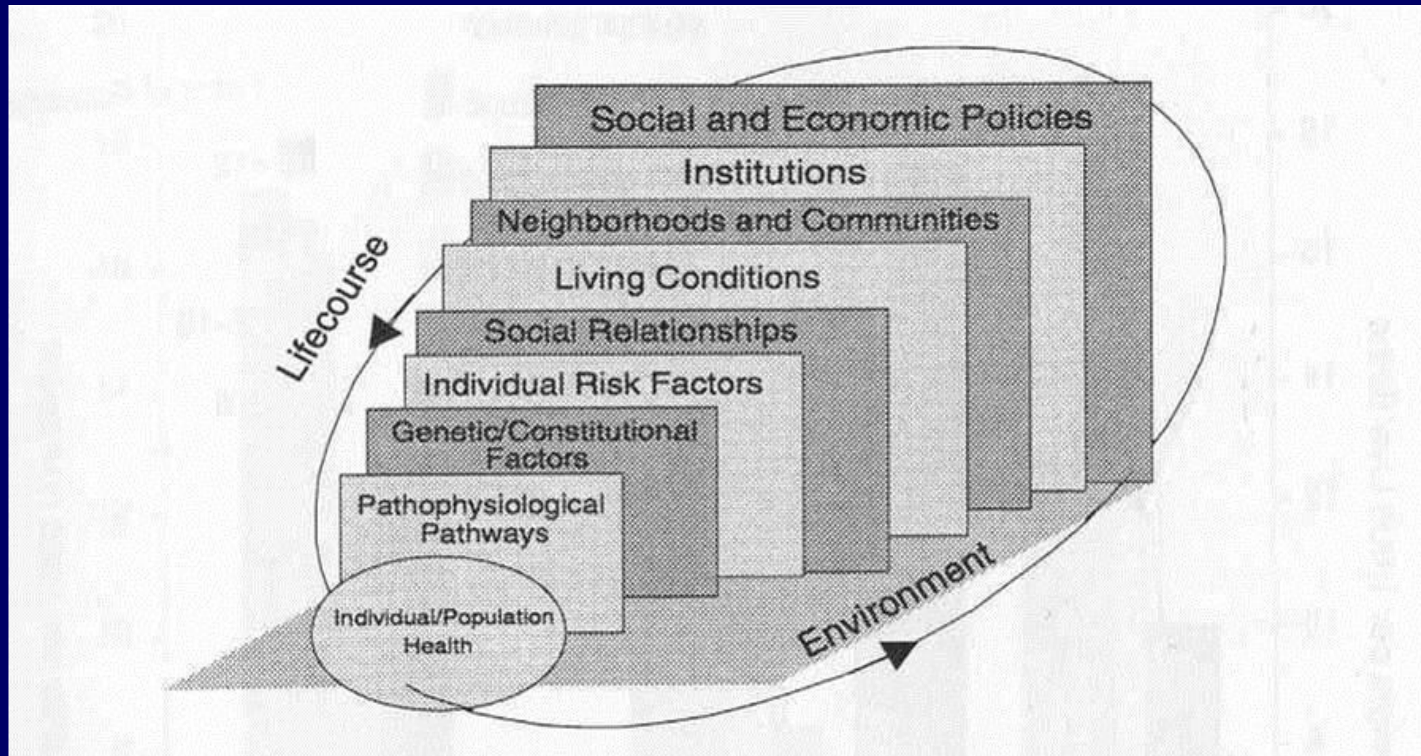
"The causes of health disparities are multiple. They include poverty, level of education, inadequate access to medical care, lack of health insurance, societal discrimination and lack of complete knowledge of the causes, treatment and prevention of serious diseases affecting different populations. The 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…

Ruth Kirstein, Acting Director of NIH. 2001

"….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"

Institute of Medicine—Unequal Treatment Report 2002

The Circles of Influence on Health



Kaplan, et al. (2000). A Multilevel Framework for Health in :Promoting Health. Washington, DC: National Academy Press

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

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*

Example

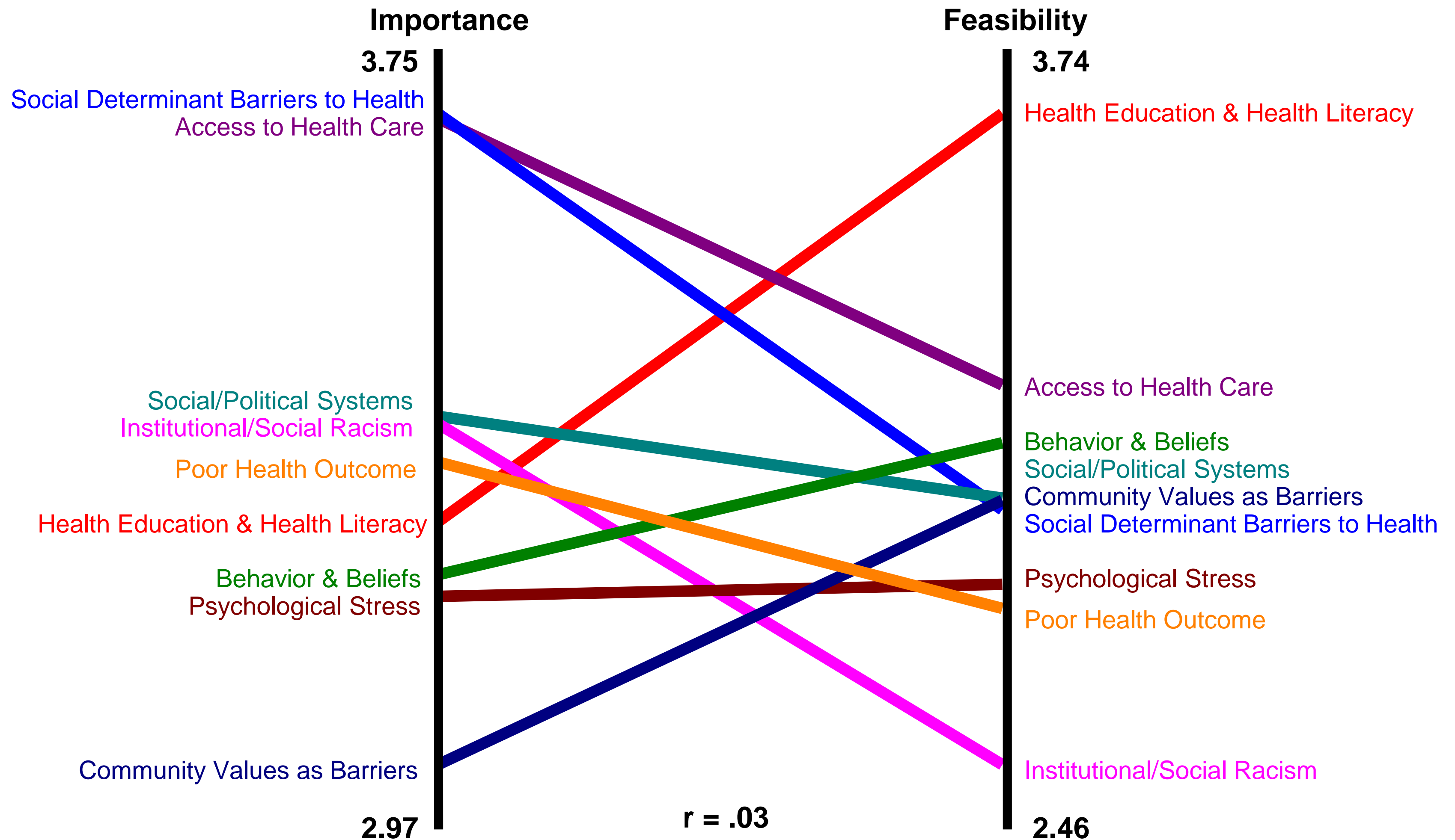
Finding Answers: Disparities Research for Change

"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?

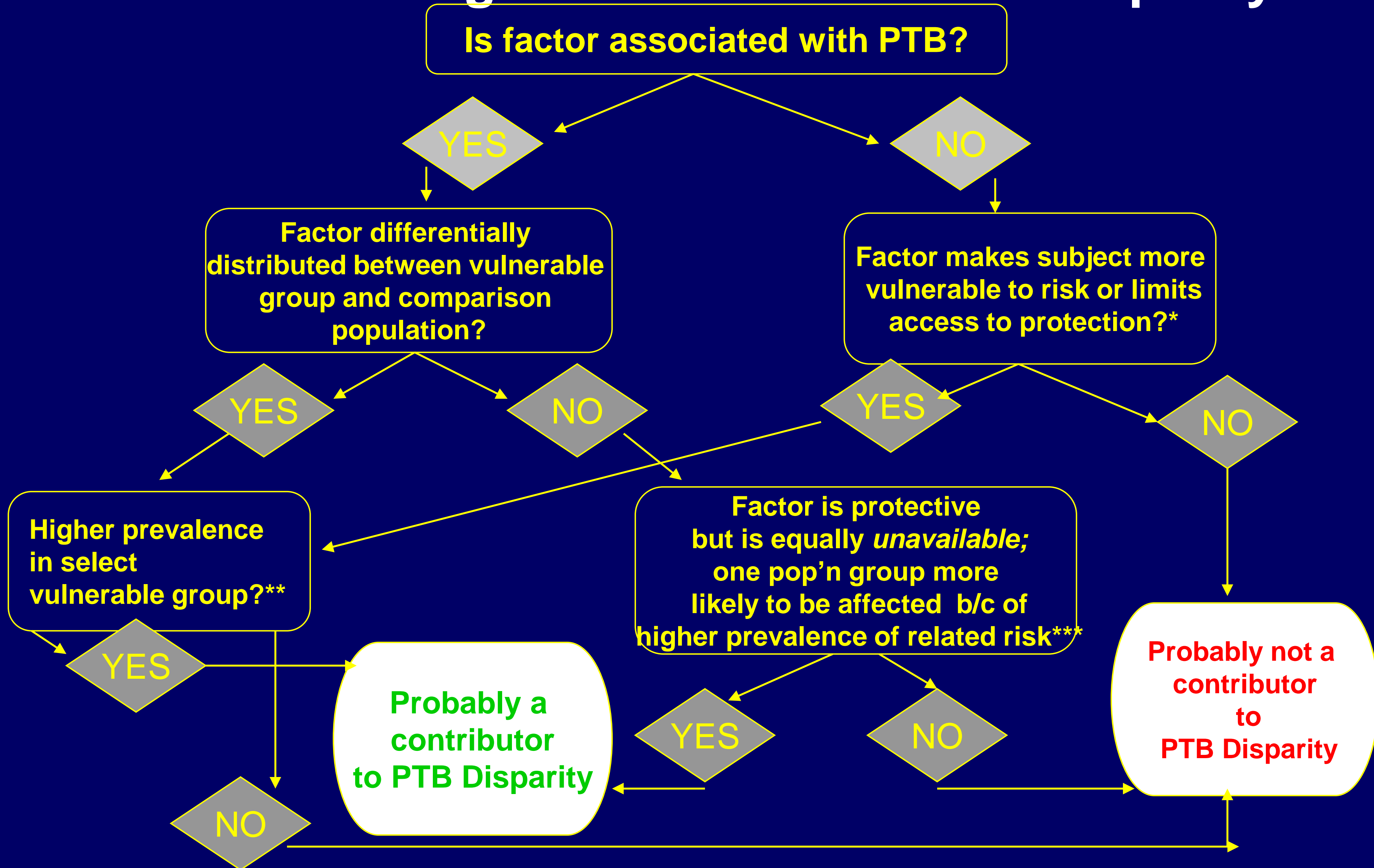
- How do we prioritize factors to get at the ones that contribute the *most*?

Factors of Interest to SACIM Members

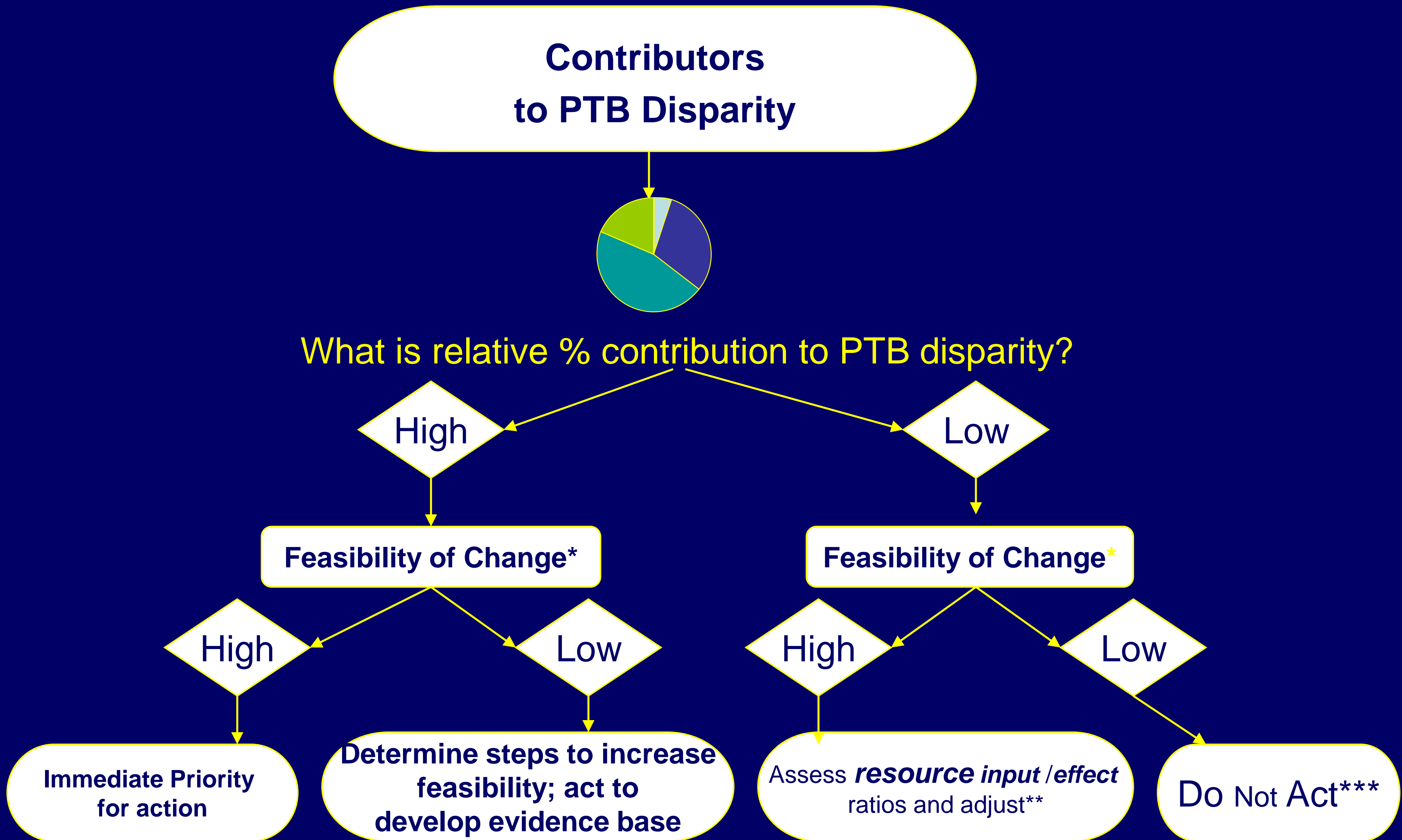
- obesity
- role of fathers
- intergenerational influences
- beliefs/faith/resilience
- role of faith based institutions
- racism, stress and SES

Hogan V. UNC-CH 5/2003

Logic Model
Determining Contributors to PTB Disparity



Logic Model:
Planning Strategies to Eliminate PTB Disparities



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