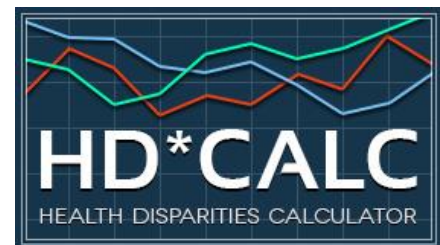


Health Disparities Calculator (HD*Calc): A Methodologically Rigorous Tool for Estimating Health Disparities



Webinar Presenters

Part 1 - Introduction of
HD*Calc and Review of
Measurement of Health
Disparities

By Mandi Yu
Mathematical Statistician,
Program Director
Division of Cancer Control and
Population Sciences
National Cancer Institute

Part 2 - Live
Demonstration of
HD*Calc

By Steve Scoppa
Senior Systems Analyst
Information Management
Services

Acknowledgements - HD*Calc Development Team

NIH/NCI

- Dr. Erin Kent
- Dr. Denise Lewis
- Dr. Benmei Liu

NIH/NIMHD

- Dr. Nancy Breen

University of Maryland

- Dr. Yan Li

University of Georgetown

- Dr. Jaeil Ahn
- Dr. George Luta

Information Management Services

- Mr. Dave Campbell
- Mr. Steve Scoppa,
- Mr. Joe Zou

** Some slides presented here are authored by my colleagues and have been previously presented.*

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Mandi Yu, Ph.D.

National Cancer Institute

Eliminate Health Disparities

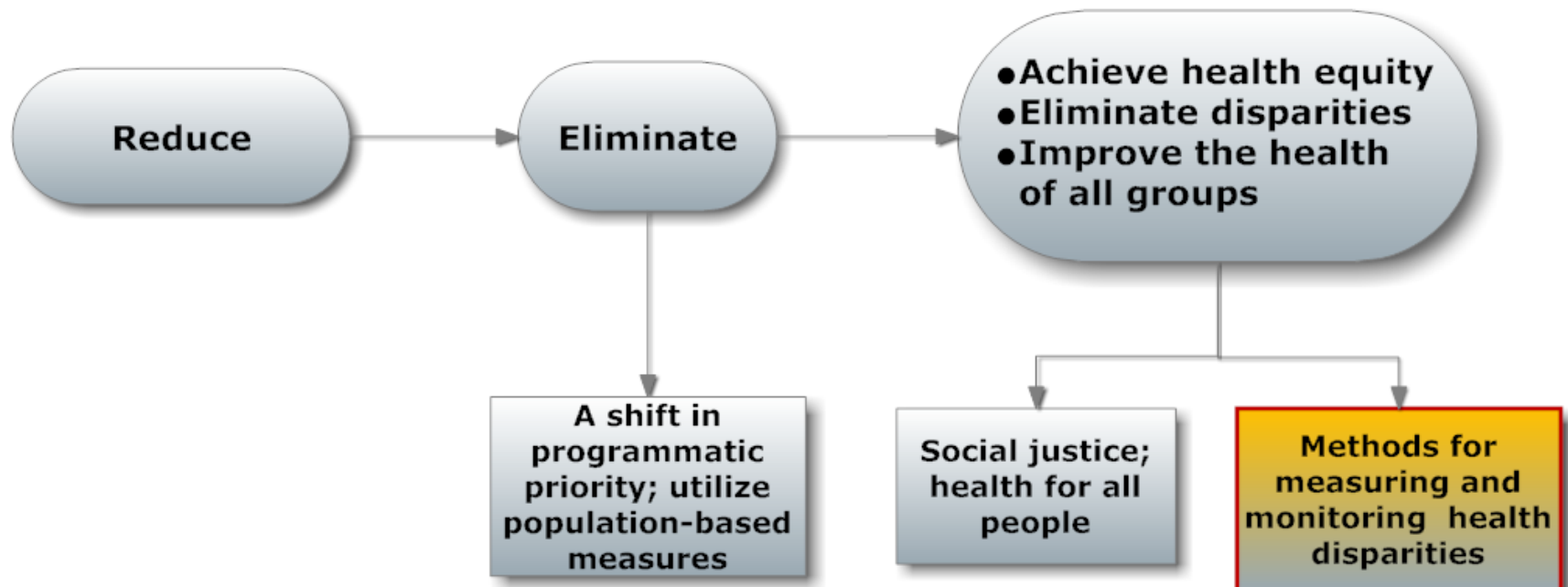
A **Healthy People** Overarching Goal

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2000

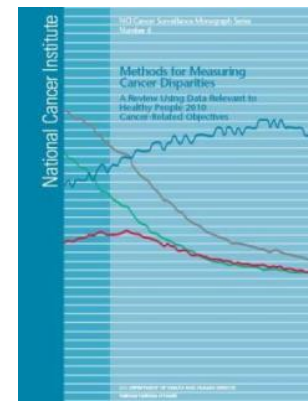
2010

2020



Overview of HD*Calc

- Background: Two NCI Monographs
 - Methods for Measuring Cancer Disparities (2005)
 - Selected Comparisons of Measures of Health Disparities (2007)
- HD*Calc calculates 11 measures of disparities
- First release (Version 1.1.0) in January 2010
 - Freely available at <http://seer.cancer.gov/hdcalc>
 - Easy integration with other NCI Programs such as SEER*Stat and Joinpoint
- Support health outcomes collected from population-based disease surveillance data
 - Rates of cancer incidence or mortality, and cancer survival statistics



Recent Extension to Complex Survey Data

- Health outcome collected from complex survey samples, such as National Health Interview Survey and National Health and Nutrition Examination Survey.
- Such as % of obesity, % of mammography use
- Estimation methods consider complex sampling features, such as stratification, clustering, and sampling weights (to account for unequal sampling probability)

Population-based Surveillance Data

- Complete information on cancer diagnosis and death (Census)
- Every cancer diagnosis (death) is assumed to be identically independently distributed
- All social groups, such as age group, racial group and SES group, are independent

Probability-based Complex Samples

- Partial information that is limited to sampled cases (Sample)
- Observations can be correlated due to clustered sampling
- Social groups are correlated except for those controlled for by sampling design

Disparity Measure	Ref. Group	All Social Groups	SES Gradient	Social Group Weighted	Inequality Aversion Parameter
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Absolute Measures

Absolute Difference	Best	No	Yes	No	No
Extended Absolute Concentration Index	Average	Yes	Yes	Yes	Yes
Between Group Variance	Average	Yes	No	Yes	No
Slope Index of Inequality	Average	Yes	Yes	Yes	No

Relative Measures

Relative Difference	Best	No	Yes	No	No
Extended Relative Concentration Index	Average	Yes	Yes	Yes	Yes
Mean Log Deviation	Average	Yes	No	Yes	No
Relative index of Inequality	Average	Yes	Yes	Yes	No
Index of Disparity	Best	Yes	No	No	No
Theil Index	Average	Yes	No	Yes	No
Kunst-Mackenbach Relative Index	Average	Yes	Yes	Yes	No

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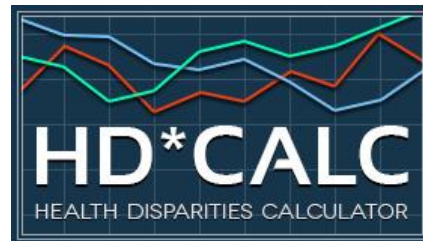
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Why a Suite of Indicators is a More Rigorous Approach to Measuring HD?



Amartya Sen, *On Economic Inequality*, 1997

“Inequality” is an ambiguous concept involving multiple dimensions

“If a concept has some basic ambiguity, then a *precise* representation of that ambiguous concept must *preserve* that ambiguity...for *descriptive accuracy* in inequality measurement....”



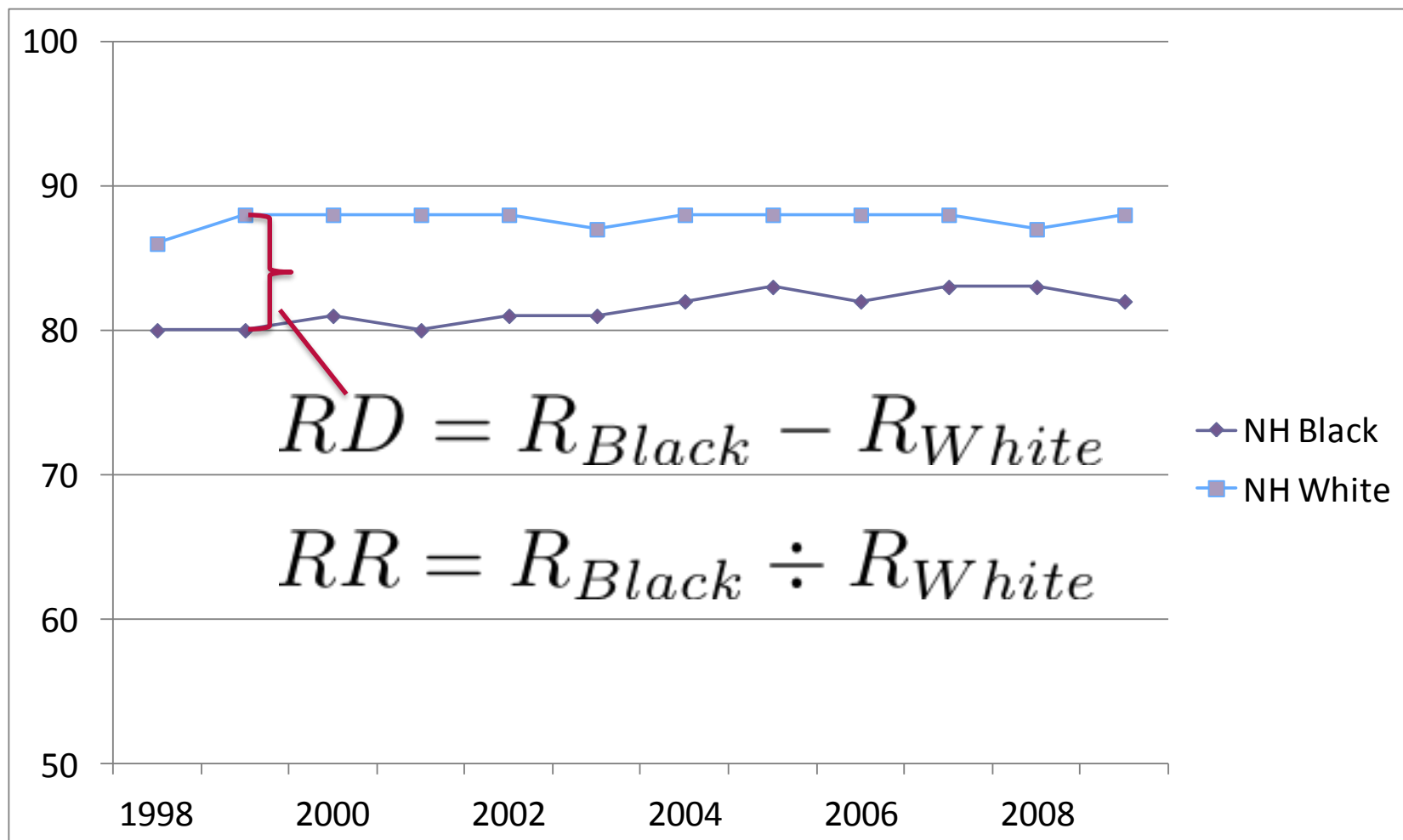
HD*Calc Measurement Considerations

1. Number of groups: How many groups are being compared?
2. Scale: Is inequality relative or absolute?
3. Weighting: Who counts, and for how much?
4. Disparity variable: Reflect SES Gradient?
5. Reference points: Different from what?
6. Value Judgement: What are more important?

1. Number of Groups

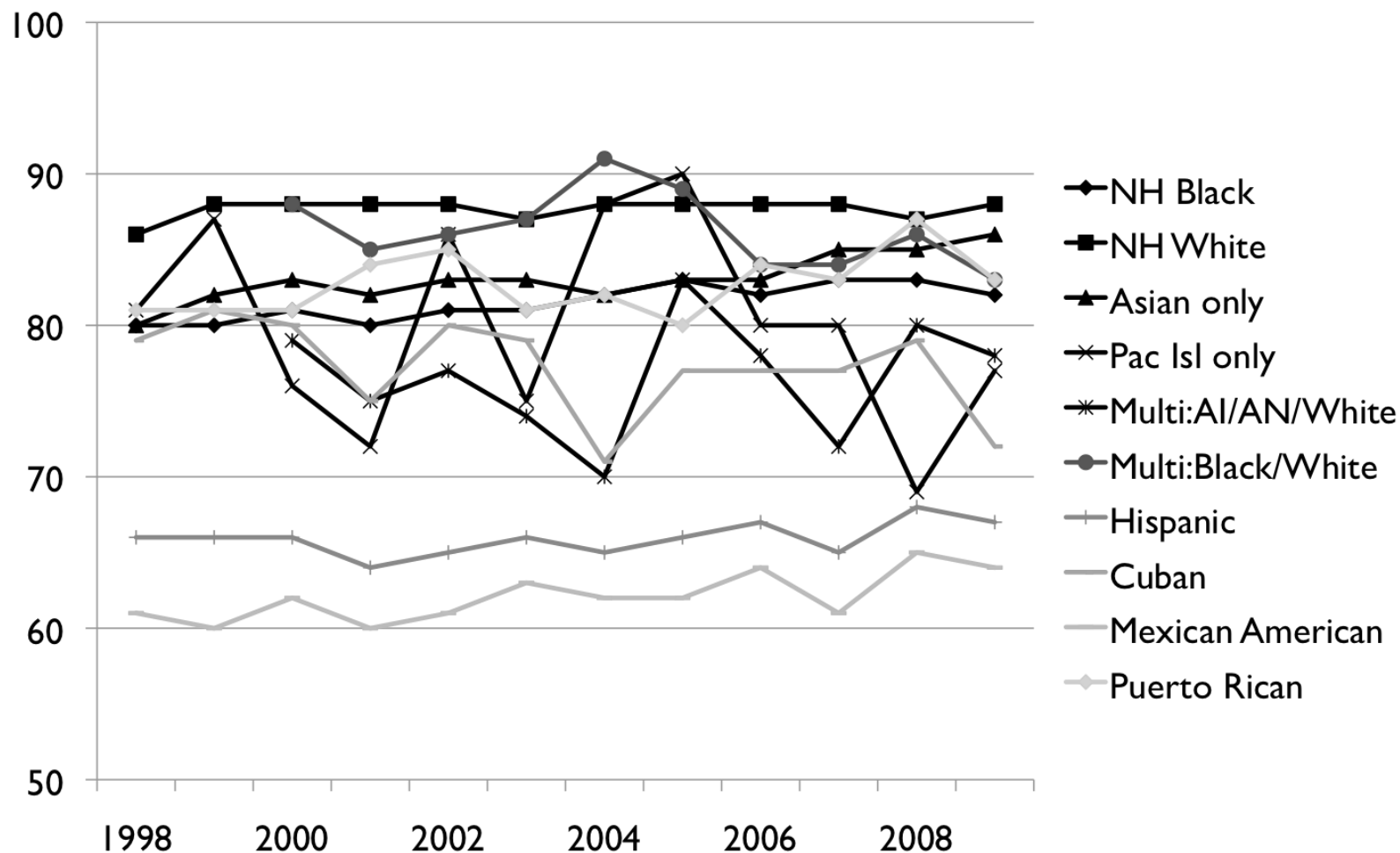
Two vs. Multiple Comparisons

Pairwise Comparisons Work Well for a Few Groups

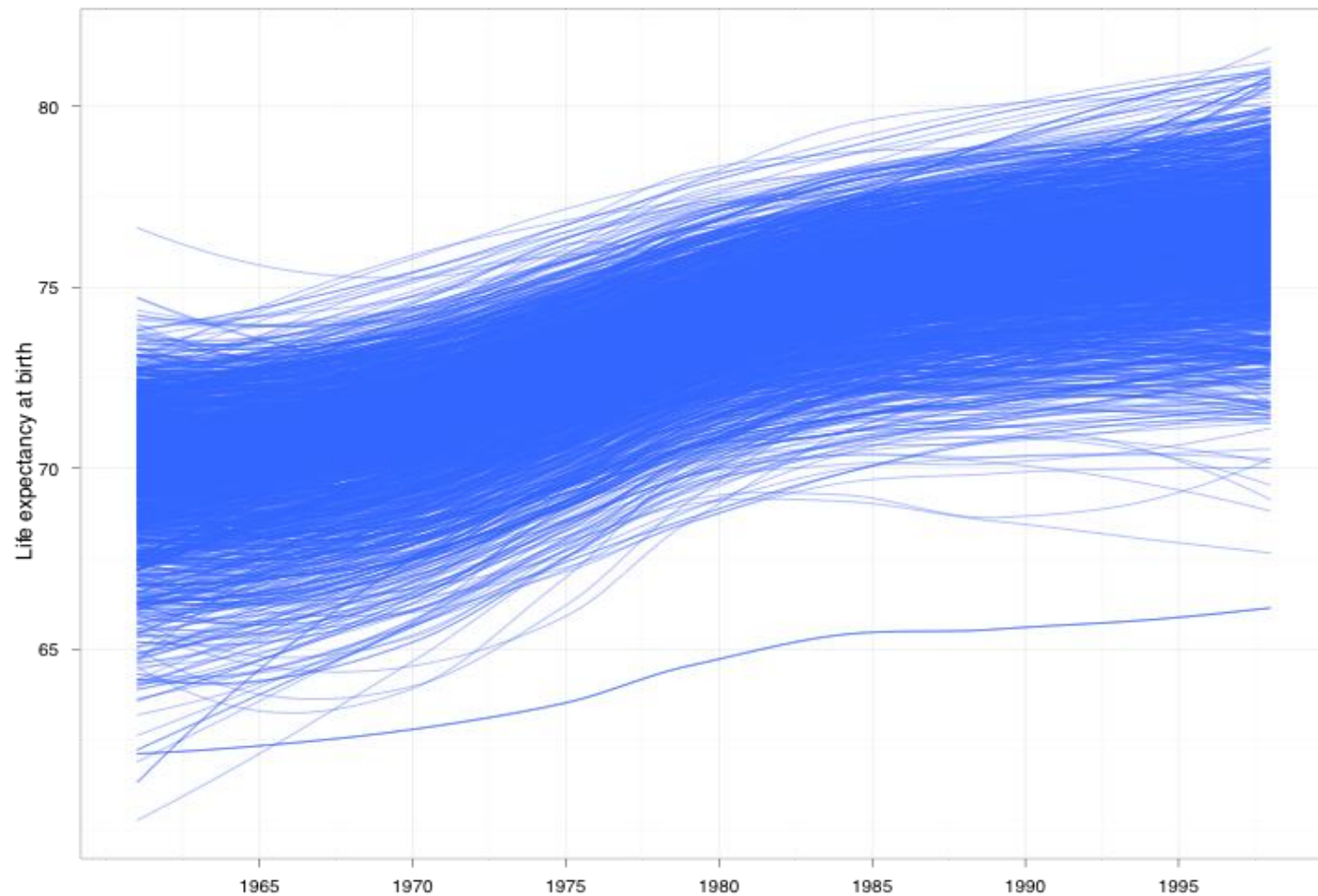


Additional Subgroups Make Summary Measures Appealing

Percent of Persons Under 65 Years of Age with Health Insurance



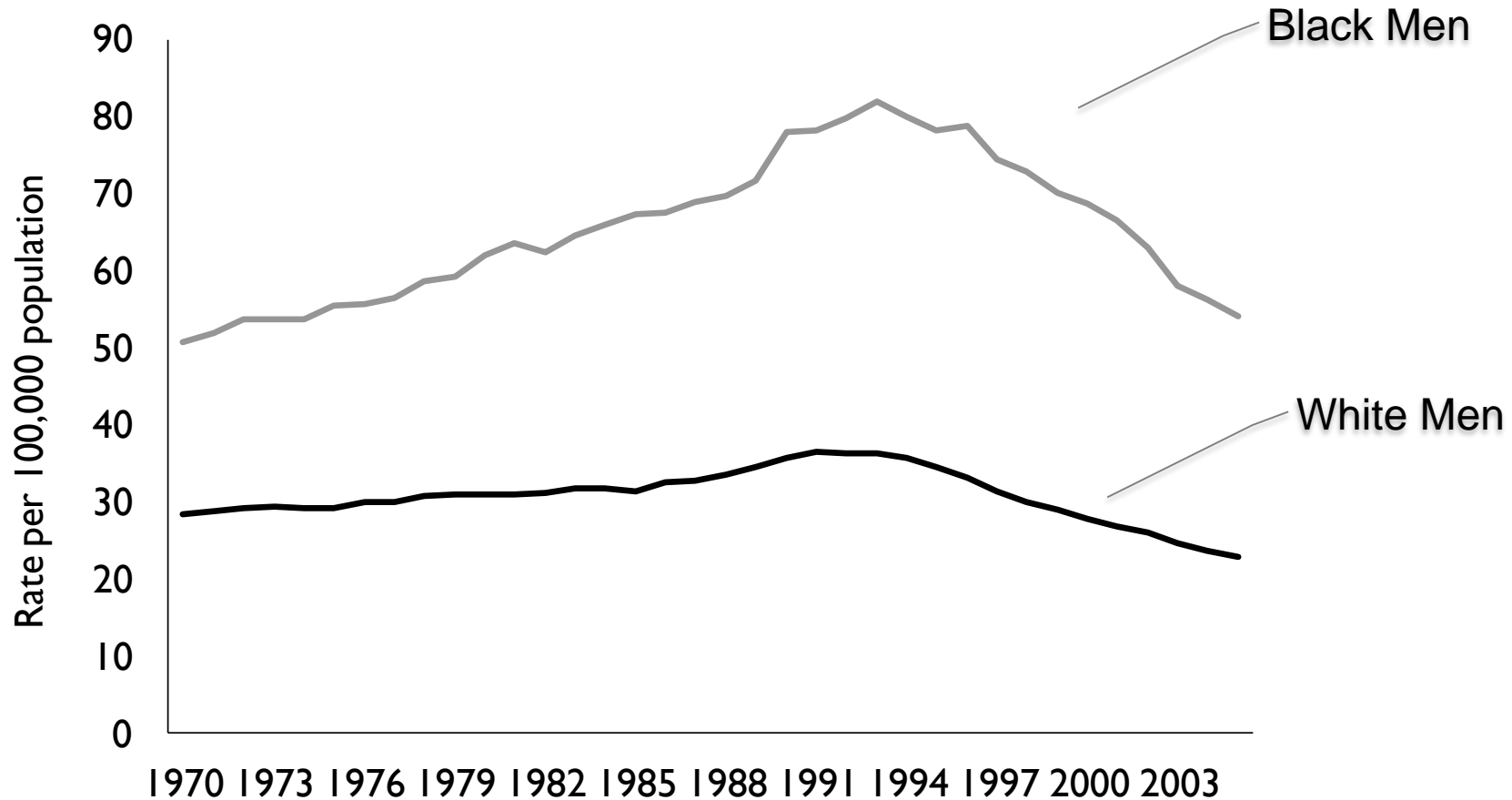
Or necessary



2. Scale

Is Inequality Absolute or Relative?

US Prostate Cancer Mortality, 1969-2005



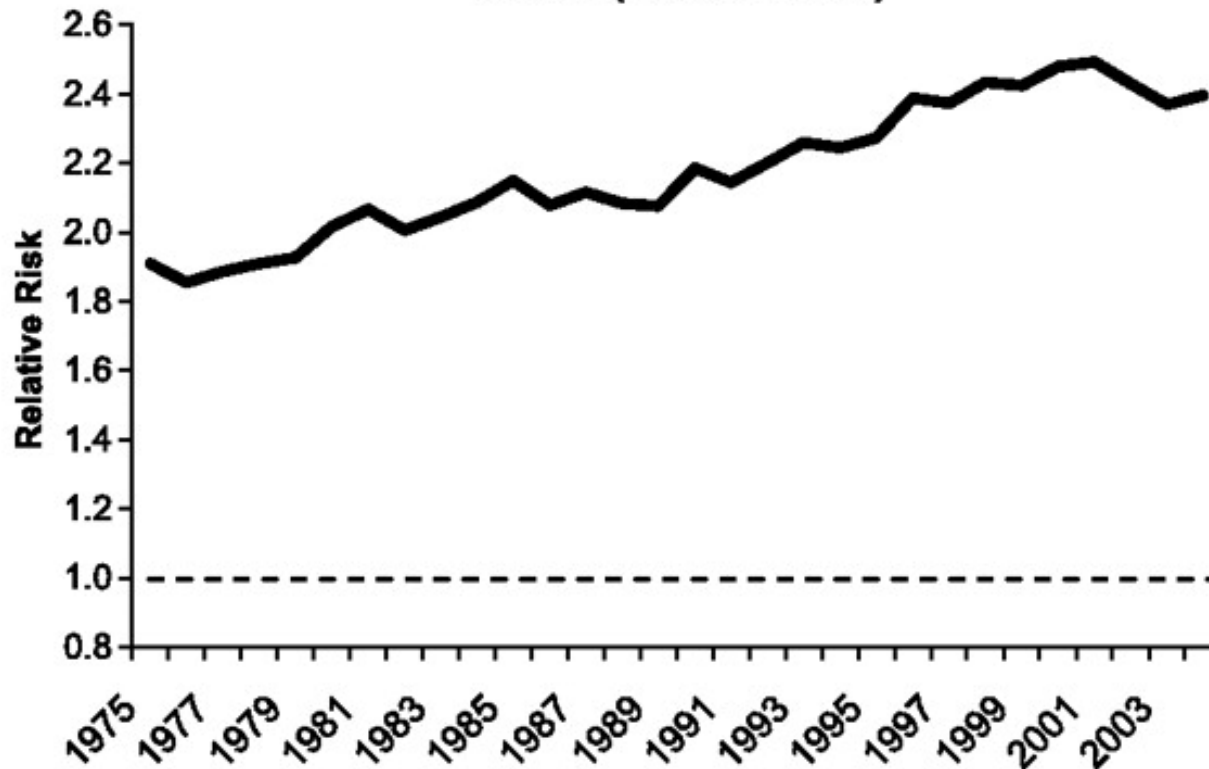
Source: SEER*Stat Database, 2008

Recent Trends in Black-White Disparities in Cancer Mortality

John Oliver L. DeLancey, Michael J. Thun, Ahmedin Jemal, and Elizabeth M. Ward

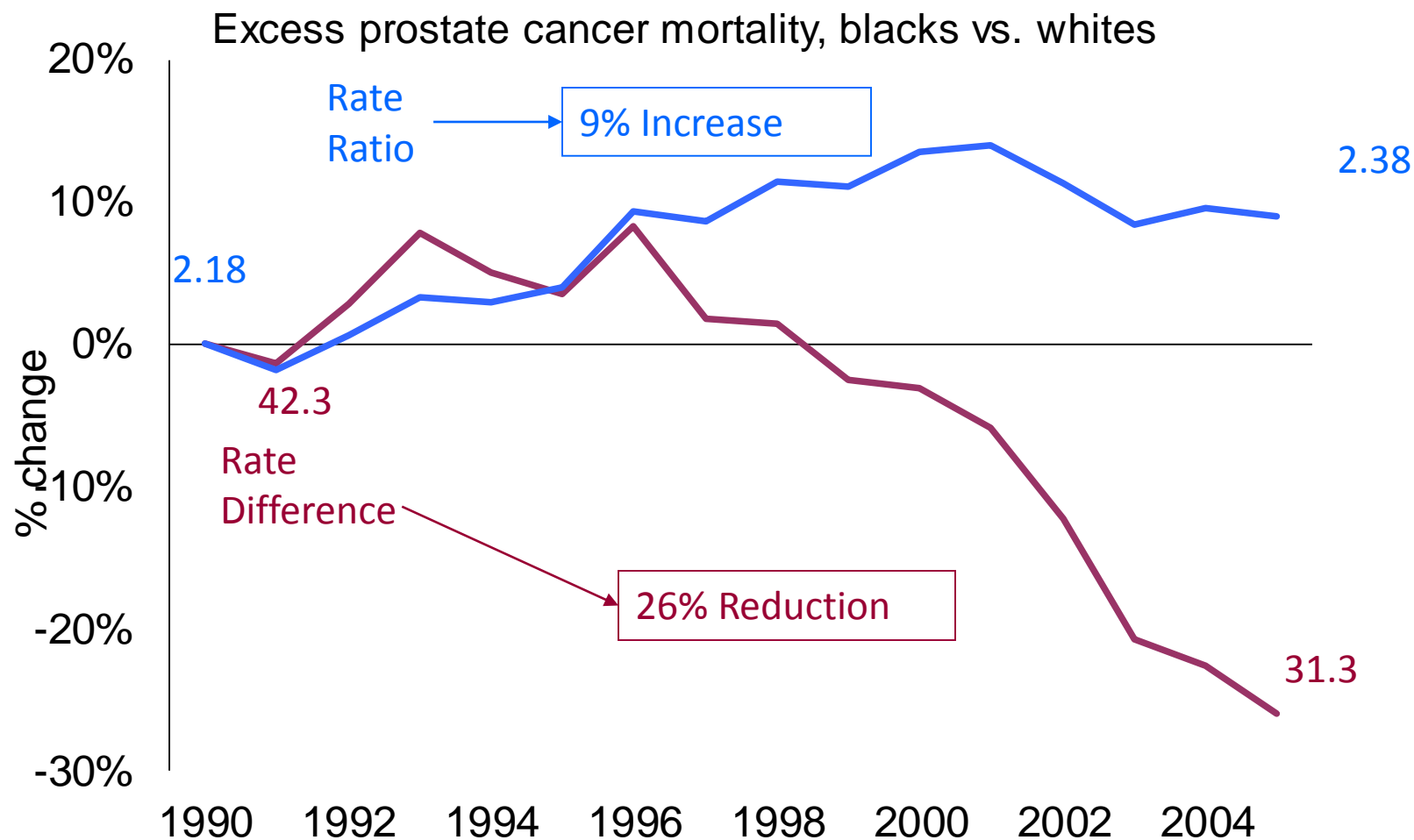
Cancer Epidemiol Biomarkers Prev 2008;17(11). November 2008

Prostate Cancer Mortality Relative Risk in Males (Black/White)



“...**racial disparities** in mortality from cancers potentially affected by screening and treatment **increased** over most of the interval since 1975.”

Diverging Measures of Inequality: Are we making progress?



Relative or Absolute Inequality?

“There is no economic theory that tells us that inequality is relative, not absolute. It is not that one concept is right and the other wrong. Nor are they two ways of measuring the same thing. Rather, **they are two different concepts.**”

-Martin Ravallion, 2004
World Bank Economist

“We recommend using both an absolute and a relative disparity measure”

-Methods for Measuring Cancer Disparities
NCI 2005

3. Weighting

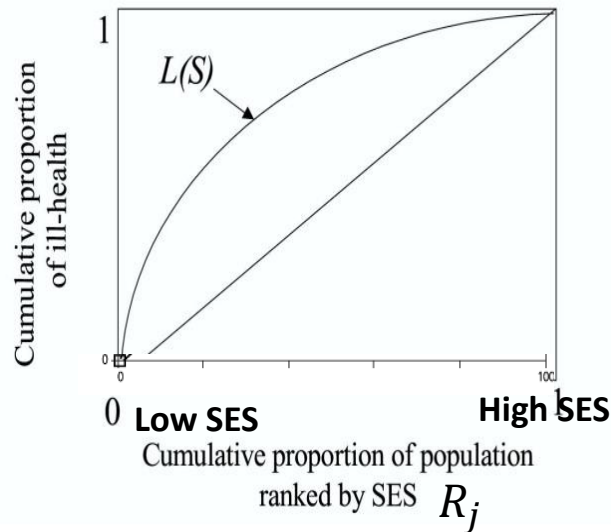
Should we count individuals equally or social groups equally when evaluating inequality?

Issues to consider regarding weighting

- Weighting *individuals* equally is consistent with the practice of estimating population average health, and allows for inequality measures to be responsive to demographic change.
- Weighting *social groups* equally (and therefore individuals unequally in most cases) may make sense if one is concerned with disproportionate impacts on small or marginalized social groups.

4. Reflect SES Gradient?

Extended Relative Concentration Index (eRCI):



Source: Wagstaff 2000. *Bulletin of the World Health Organization*

Mean Log Deviation (MLD):

$$\frac{1}{\bar{\mu}} \sum_{j=1}^J p_j (\mu_j - \bar{\mu})^v (1 - R_j)^{v-1}$$

Aversion Parameter

Population weighted

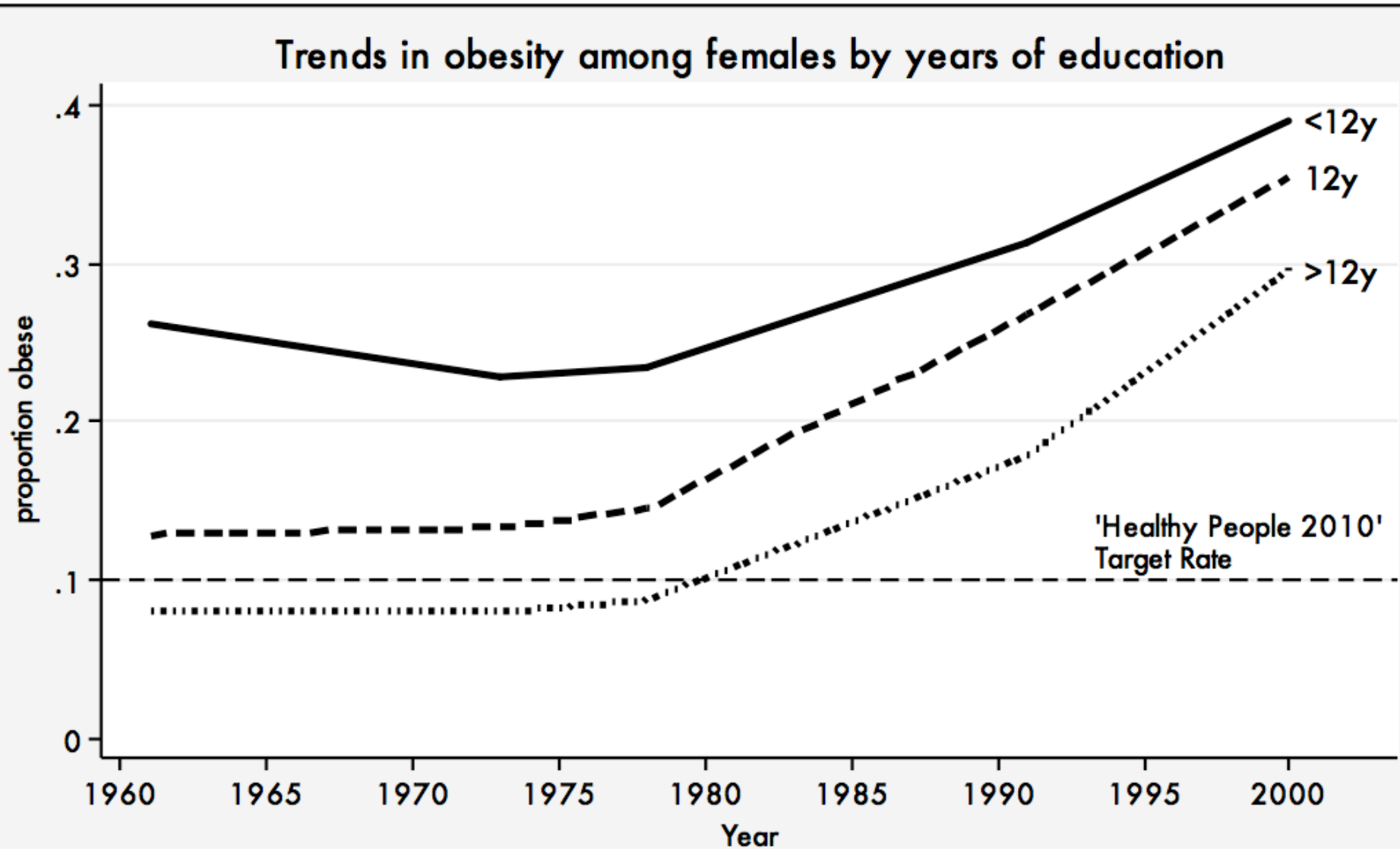
Cumulative Share of Population

$$\sum_{j=1}^J p_j \ln \left(\frac{\mu_j}{\bar{\mu}} \right)$$

5. Reference points

Different from what?

All social groups are moving away from target rate



6. Inequality Aversion Parameter to Reflect Social Value Judgements

What are more important?

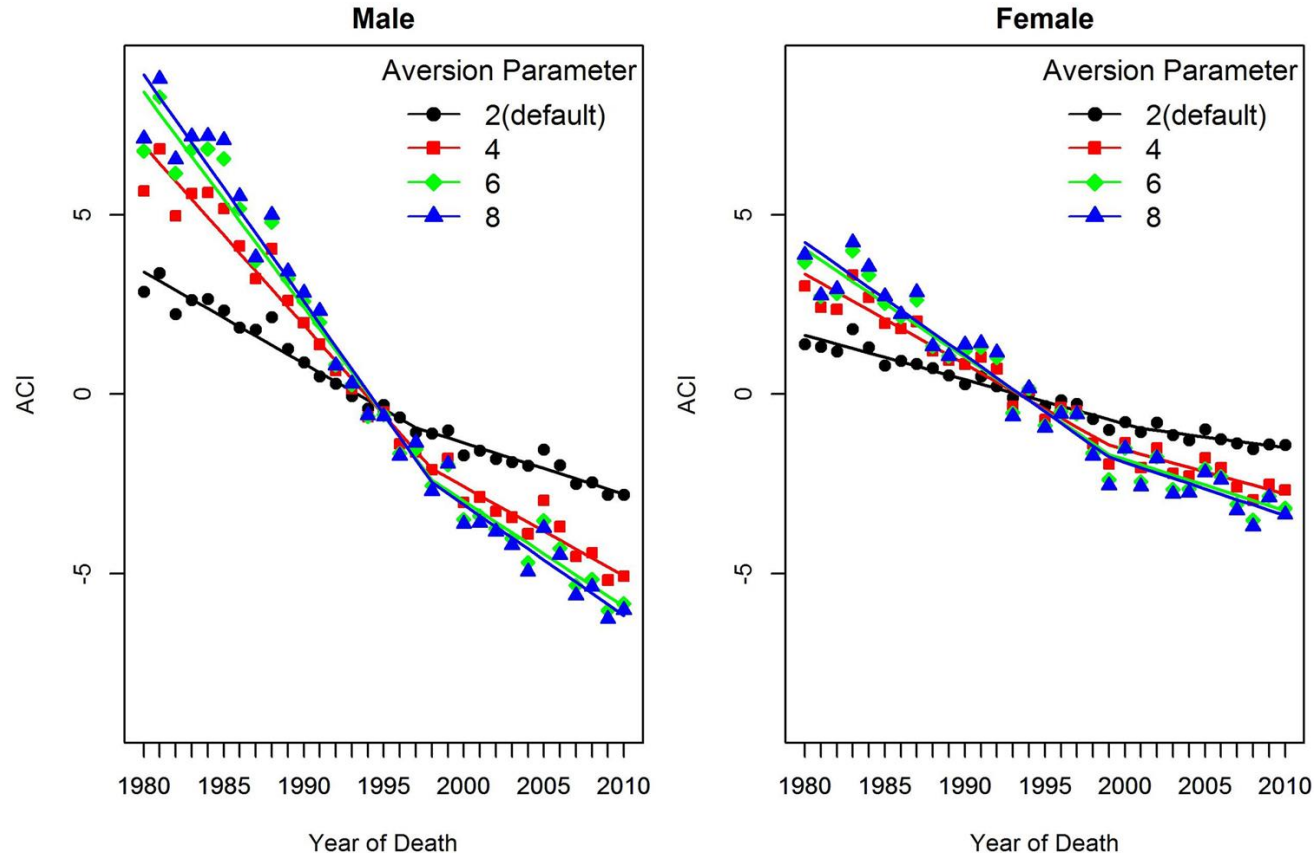
- We extended the standard ACI and RCI to allow user specify the value of aversion parameter

$$eACI = \sum_{j=1}^J p_j (\mu_j - \mu) \boldsymbol{\nu} (\mathbf{1} - R_j)^{\boldsymbol{\nu}-1}$$

↑
Modifies
each group's
contribution

- Standard ACI = $2 \sum_{j=1}^J p_j (\mu_j - \mu) (\mathbf{1} - R_j)$ with $\boldsymbol{\nu} = 2$

Evaluate SES Disparities in Colorectal Cancer Mortality Rates, U.S., 1980-2010 using eACI



Source: Breen et al. *Cancer Causes Control*, "Assessing disparities in colorectal cancer mortality by socioeconomic status using new tools: health disparities calculator and socioeconomic quintiles"

Conclusions

- Health disparities research is complex and multi-dimensional
- The choices have an important impact on both the magnitude of health inequality and whether health inequalities are worsening or improving.
- Monitoring health inequalities requires both precise measurement and value judgments—they are inseparable.
- A suite of health inequality measures is likely necessary to provide a complete description of the magnitude of inequality.

A large, stylized blue chevron graphic pointing to the right, composed of two overlapping shapes, occupies the left side of the slide.

Steve Scoppa

Information Management Services