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

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Part 2 - Live Demonstration of HD*Calc

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NIH/NCI
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- Dr. Denise Lewis
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NIH/NIMHD
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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.
Eliminate Health Disparities

A *Healthy People* Overarching Goal

A *Healthy People* Overarching Goal

2000

Reduce

2010

Eliminate

A shift in programmatic priority; utilize population-based measures

2020

- Achieve health equity
- Eliminate disparities
- Improve the health of all groups

Social justice; health for all people

Methods for measuring and monitoring health disparities
Overview of HD*Calc

- Background: Two NCI Monographs
  - 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
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Why a Suite of Indicators is a More Rigorous Approach to Measuring HD?
“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

\[ RD = R_{Black} - R_{White} \]

\[ RR = \frac{R_{Black}}{R_{White}} \]
Additional Subgroups Make Summary Measures Appealing

Percent of Persons Under 65 Years of Age with Health Insurance

- NH Black
- NH White
- Asian only
- Pac Isl only
- Multi:Al/AN/White
- Multi:Black/White
- Hispanic
- Cuban
- Mexican American
- Puerto Rican
Or necessary
2. Scale

Is Inequality Absolute or Relative?
US Prostate Cancer Mortality, 1969-2005

Source: SEER*Stat Database, 2008
“...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?

Excess prostate cancer mortality, blacks vs. whites

% change

Rate Ratio
9% Increase

Rate Difference
26% Reduction

2.38
2.18
42.3
31.3

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):

\[
\frac{1}{\mu} \sum_{j=1}^{J} p_j (\mu_j - \mu) \nu (1 - R_j)^{v-1}
\]

Mean Log Deviation (MLD):

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

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

\[ eACI = \sum_{j=1}^{J} p_j (\mu_j - \mu) \nu (1 - R_j)^{\nu-1} \]

Modifies each group’s contribution

- Standard ACI = \[ 2 \sum_{j=1}^{J} p_j (\mu_j - \mu) (1 - R_j) \] with \( \nu = 2 \)
Evaluate SES Disparities in Colorectal Cancer Mortality Rates, U.S., 1980-2010 using eACI

Source: Breen at 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.