HD*Calc: measuring health disparities across and beyond the cancer control continuum

Erin E. Kent, PhD
Epidemiologist & Program Director
Outcomes Research Branch
Healthcare Delivery Research Program
Division of Cancer Control and Population Sciences
Erin.Kent@nih.gov

NCI CRCHD PACHE Conference
June 13, 2016
National goal to eliminate health disparities

Eliminate Health Disparities
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 Tool

• Background: Two NCI Monographs
  – *Methods for Measuring Cancer Disparities*
  – *Selected Comparisons of Measures of Health Disparities*

• HD*Calc Calculates 11 measures of inequality
  – Easy integration with other NCI Programs like SEER*Stat and Joinpoint

• Displays trends in inequality in tabular and graphical formats

• Can be used with any data set whose formatting is compatible with HD*Calc

• Freely available at: http://seer.cancer.gov/hdcalc/
Health Disparities Calculator: A Methodologically Rigorous Tool for Analyzing Inequalities in Population Health

Historically, researchers and policy planners have selected a single indicator to measure trends in social inequalities. A more rigorous approach is to review the literature and data, select appropriate inequality measures to address the research question, compute results from various indices, and graphically compare resulting trends. The Health Disparities Calculator (HD*Calc, version 1.2.4: National Cancer Institute, Bethesda, MD) computes results from different indices and graphically displays them, making an arduous task easier, more transparent, and more accessible.
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. **Reference points**: Different from what?
1. Number of Groups

Two vs. Multiple Comparisons
Pairwise comparisons work well for a few groups

% of persons under 65 years of age with health insurance

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

\[ RR = \frac{R_{Black}}{R_{White}} \]

Source: NHIS Data 2010
Additional subgroups make summary measures appealing…
Additional subgroups make summary measures appealing…

% 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

Life expectancy in US counties, 1961-98

Source: Ezzati et al. 2008
2. Scale

Is Inequality Absolute or Relative?
US prostate cancer mortality, 1969-2005

Rate per 100,000 population


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

Rate Ratio  9% Increase

Source: SEER*Stat Database, 2008
Diverging Measures of Inequality: Are we making progress?

Excess prostate cancer mortality, blacks vs. whites

Source: SEER*Stat Database, 2008
“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. Reference points

Different from what?
All social groups are moving away from target rate
Movement away from targets may reduce inequality

Changes in absolute and relative educational disparity in obesity among females

measures of absolute disparity

measures of relative disparity

Percent change since 1961

Year

RCI
IDisp
DDisp
RR
MLD

ACI
RD
BGV
## Summary Table of Advantages and Disadvantages of Potential Health Disparity Measures

<table>
<thead>
<tr>
<th>Disparity Measure</th>
<th>Absolute or Relative</th>
<th>Ref Group</th>
<th>All Social Groups</th>
<th>SES Gradient</th>
<th>Social Group Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute Difference (AD)</td>
<td>Absolute</td>
<td>Best</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Relative Difference (RD)</td>
<td>Relative</td>
<td>Best</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Slope Index of Inequality (SII)</td>
<td>Absolute</td>
<td>Average</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Relative Index of Inequality (RII)</td>
<td>Relative</td>
<td>Average</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Index of Disparity (ID$_{isp}$)</td>
<td>Relative</td>
<td>Best</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative Concentration Index (RCI)</td>
<td>Relative</td>
<td>Average</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Absolute Concentration Index (ACI)</td>
<td>Absolute</td>
<td>Average</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Between Group Variance (BGV)</td>
<td>Absolute</td>
<td>Average</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Theil Index (T)</td>
<td>Relative</td>
<td>Average</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Kunst-Mackenbach Relative Index (KMI)</td>
<td>Relative</td>
<td>Average</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Mean Log Deviation (MLD)</td>
<td>Relative</td>
<td>Average</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

Measurement Considerations

• Measurement choices have an important impact on our judgments of 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 provides a more complete description of the magnitude of inequality.
• No summary disparity measure should be used as a substitute for detailed inspection of the health status indicators for each social group via tables and graphs.
http://seer.cancer.gov/hdcalc/
Opening HD*Calc

Welcome to the Health Disparities Calculator - HD*Calc

HD*Calc uses data that you supply, to calculate several measures of disparity. To get started, open a file that contains data about the disparity groups you wish to compare.

Note to statisticians:

We recommend that all input statistics be based on 30 or more degrees of freedom (df). For population data, df = n - 1. For survey data, for a simple random sample of size n, df = n - 1. For a survey with multistage sampling design, df is typically set to the # (sampled PSUs) - 1 for unstratified selection of PSUs, and df = # (sampled PSUs) - 1 for stratified selection of PSUs from L strata. For complex survey data with no design information provided but with replicate survey weights, df is typically equal to the number of replicate weights. Because of the complexity of df calculation for different situations, HD*Calc simply uses a normal assumption.

Show this reminder in future?

[Yes] [No]
If you using SEER*Stat data, make sure you have exported a .dic file from your SEER*Stat matrix. For more information, see: http://www.seer.cancer.gov/hdcalc/tutorials/import/seerstat_data.html
May need to change the settings of your input dataset: double-click rows in “Type.” You need: Disparity variable, Stratification variable, Time variable, Population Count, and Rate Statistic. Optional: Standard Error Statistic.
Other considerations

• Also pay attention to
  – Whether social groups are “ranked” (i.e. ordinal, like income, education categories) or “not ranked” (i.e. nominal, like race/ethnicity)
  – Whether higher values of your outcome implies more or less healthy
  – Whether you want your groups weighted equally or by population share

• Click through the tabs to display the data as you like, in tabular or graphic formats, selecting on and off the disparity indices that you choose
HD*Calc Can Help You..

- Compare different summary measures of disparities by race/ethnicity, SES and geographic area
- Graphically explore underlying trends in data
  - Test significance of trends using Joinpoint
- Evaluate and select multiple summary measures for monitoring and presenting health disparities
- Easily export tables and graphs
US trends in survival disparities among adolescents and young adults with non-Hodgkin lymphoma

Erin E. Kent¹ · Nancy Breen² · Denise R. Lewis³ · Janet S. de Moor⁴ · Ashley Wilder Smith¹ · Nita L. Seibel⁵

Received: 8 December 2014/ Accepted: 30 May 2015
© Springer International Publishing Switzerland (outside the USA) 2015
Five-Year Relative Survival for AYA patients (15-39 at dx) with Non-Hodgkin Lymphoma (SEER-17 registries)

Kent et al., 2015
Absolute (BGV) and Relative (MLD) Disparities in Survival

Kent et al., 2015

Lauren M. Rossen PhD, MS*, Kenneth C. Schoendorf MD, MPH

ABSTRACT

Purpose: Although eliminating health disparities by race, ethnicity, and socioeconomic status (SES) is a top public health priority internationally and in the United States, weight-related racial/ethnic and SES disparities persist among adults and children in the United States. Few studies have examined how these disparities have changed over time; these studies are limited by the reliance on rate differences or ratios to measure disparities. We sought to advance existing research by using a set of disparity metrics on both the absolute and relative scales to examine trends in childhood obesity disparities over time.

Methods: Data from 7056 children, ages 2 to 18 years, in the National Health and Nutrition Examination Surveys were used to explore trends in racial/ethnic and SES disparities in pediatric obesity from 2001 to 2010 using a set of different disparity metrics.

Results: Racial/ethnic and SES-related disparities in pediatric obesity did not change significantly from 2001 to 2010 and remain significant.

Conclusions: Disparities in obesity have not improved during the past decade. The use of different disparity metrics may lead to different conclusions with respect to how disparities have changed over time, highlighting the need to evaluate disparities using a variety of metrics.

Published by Elsevier Inc.
Fig. 4 Change (%) in SES disparities in obesity among youth between 2 and 18 years, 2001–2002 to 2009–2010. Increasing values on all disparity metrics indicate widening disparities; the ACI and RCI were multiplied by $-1$ so that increasing values would be consistent with worsening disparities. Rossen & Schoendorf, 2012.
Disparities in HRQOL of Cancer Survivors and Non-Cancer Managed Care Enrollees

Steven B. Clauser, Ph.D., M.P.A., Neeraj K. Arora, Ph.D., Keith M. Bellizzi, Ph.D., M.P.H., Samuel C. (Chris) Haffer, Ph.D., Marie Topor, and Ron D. Hays, Ph.D.

Clauser et al., 2008

<table>
<thead>
<tr>
<th>Education</th>
<th>PCS</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>30.8</td>
<td>25.0-36.6</td>
</tr>
<tr>
<td>&lt;High School</td>
<td>33.6</td>
<td>32.2-34.9</td>
</tr>
<tr>
<td>High School/GED</td>
<td>34.0</td>
<td>32.7-35.4</td>
</tr>
<tr>
<td>Some College</td>
<td>36.0</td>
<td>34.2-37.7</td>
</tr>
<tr>
<td>College Graduate</td>
<td>38.4</td>
<td>36.3-40.5</td>
</tr>
</tbody>
</table>
Example 3: Kent et al., In Prep

Adjusted* self-reported physical health of lung cancer survivors (ages 65+) over time

*Models adjust for race/ethnicity, age at survey, gender, comorbidity count, stage at diagnosis, time from diagnosis to survey, and SEER registry
Example 3: Kent et al., In Prep

Adjusted relative (MLD) and absolute (BGV) disparities in PCS for lung cancer survivors (ages 65+) over time
Acknowledgments

• HD*Calc Leadership Team
  – Nancy Breen, NIMHD
  – Denise Lewis, NCI/DCCPS/SRP
  – Antoinette Percy-Laurry, NCI/DCCPS/IS
  – Susan Scott, NCI/DCCPS/SRP
  – Felisa Gonzales, NCI/DCCPS/HDRP

Erin.Kent@nih.gov