Chronic Disease Disparities in Washington State: Exploring Changes Over Time

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Our Analytic Plan

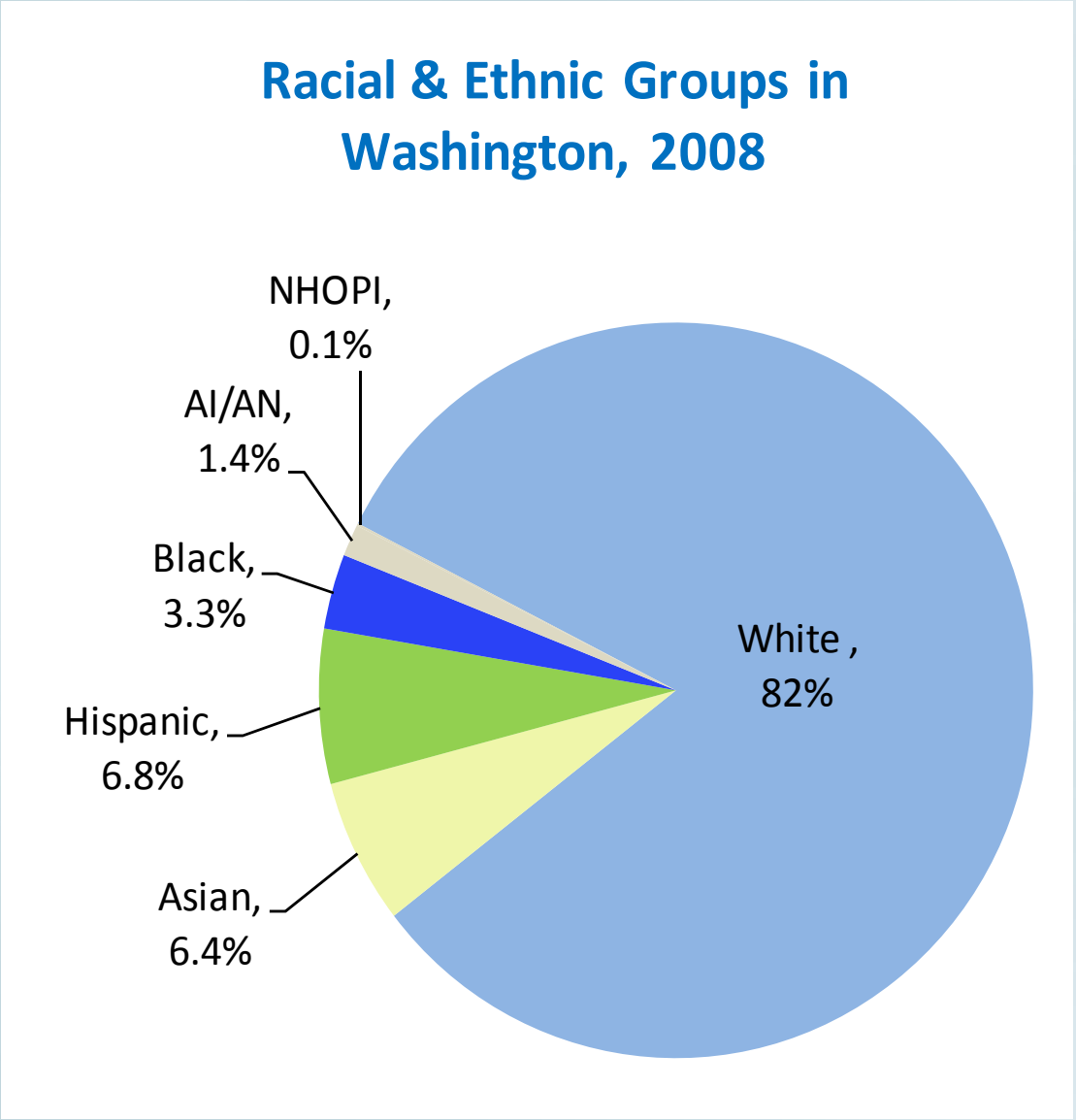
1. Time series for chronic diseases & their risk factors
    - By education & income, using range measures for absolute and relative disparities (Poster)
    - By race/ethnicity using summary indices for relative disparities (Sitaker)
        - Comparison of obesity trends for Blacks & Whites (Kemple)
2. Multilevel analysis of individual measures of social position, area measures, and a health condition (McDermot)

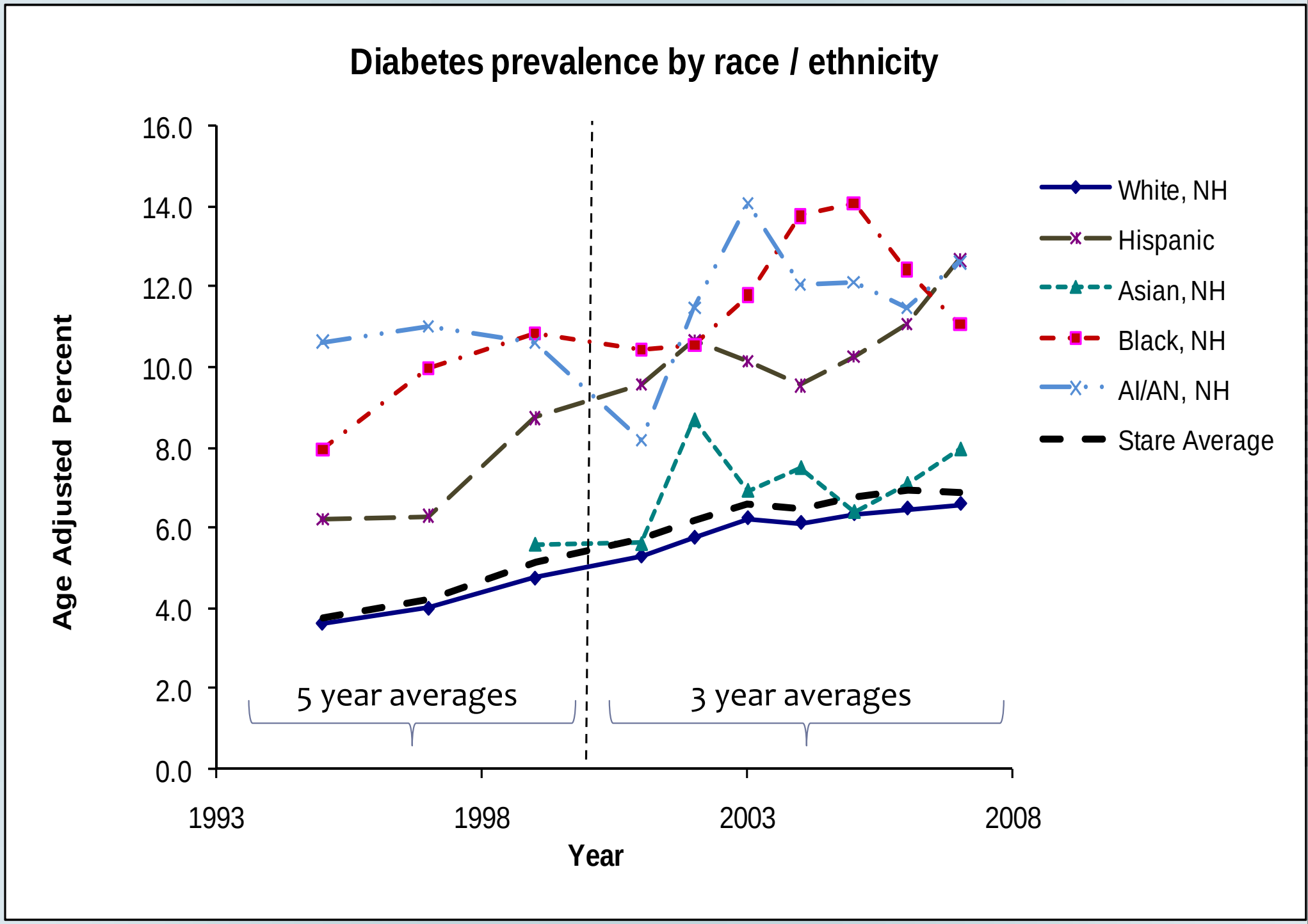
Methods

- Time series: Disparities in chronic diseases and risk factors by race & ethnicity:
  - Focus: Diabetes, obesity, smoking
  - Data Source: Washington State Behavioral Risk Factor Surveillance System, an annual random telephone survey of self-reported health behaviors and conditions.
  - Percentages are age-adjusted to eliminate impact of different age structures when comparing groups.
  - In general, we used 3 year rolling averages for trends
  - 5 categories of race/ethnicity used

Disparities by Racial and Ethnic Group

- No inherent ranking
- "Race" = socially defined groups based on superficial appearance
- Race is not merely a proxy for SES
- Racial disparities are fueled by the extra dimension of racism




Diabetes prevalence by race / ethnicity
Age Adjusted Percent
16.0
14.0
12.0
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8.0
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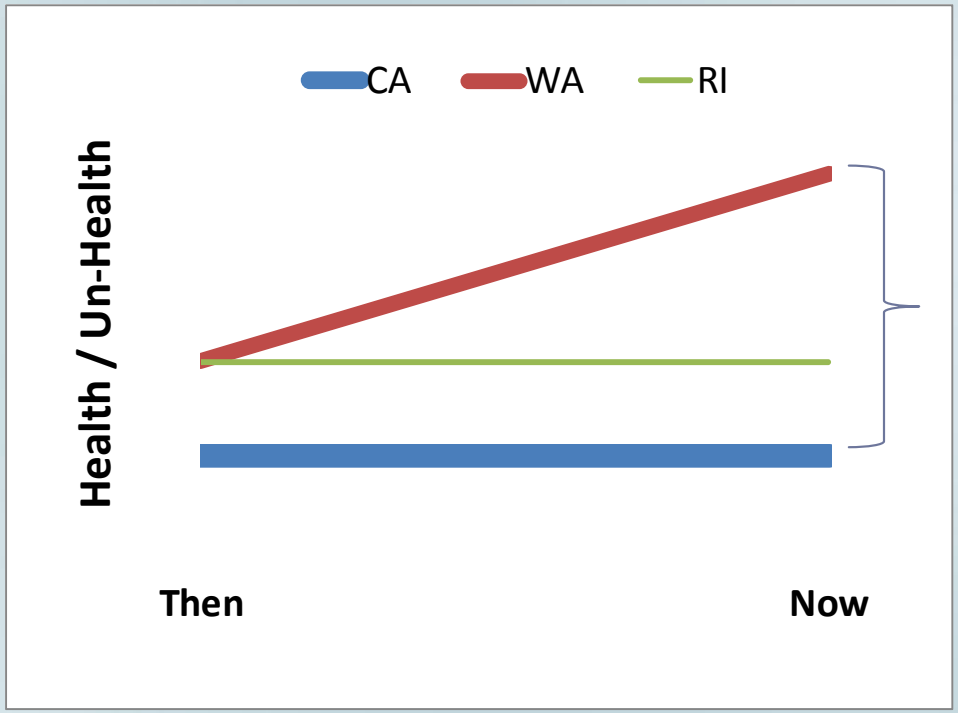
4.0
2.0
0.0
1993
1998
2003
2008
Year
5 year averages
3 year averages
White, NH
Hispanic
Asian, NH
Black, NH
AI/AN, NH
Stare Average

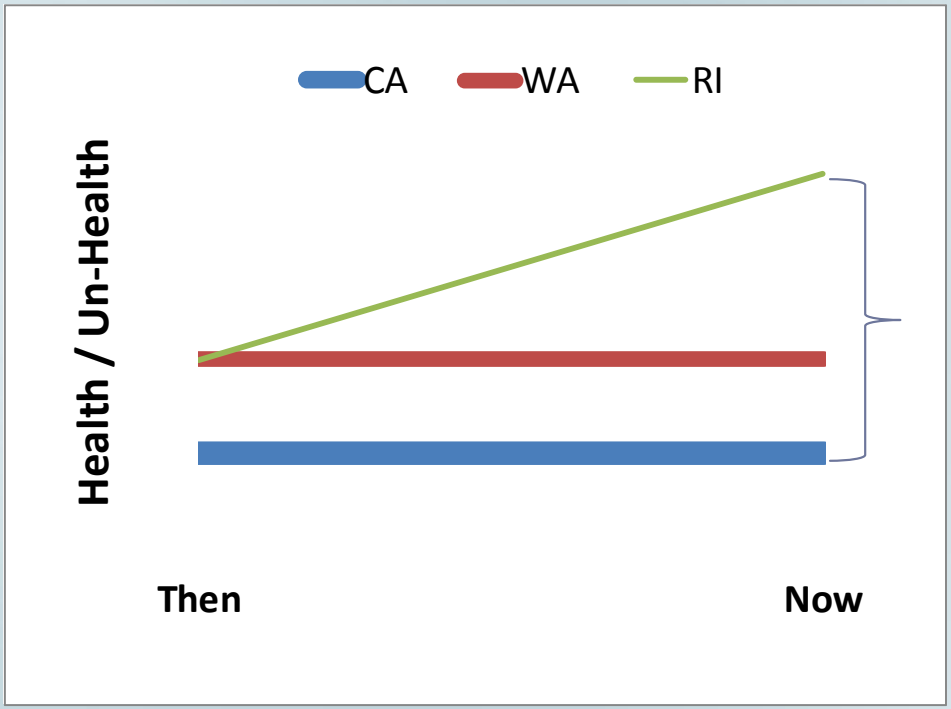
Choice of indicator = Choice of values

- To move beyond comparing the relative and absolute disparity of each racial group to a reference group, we need to find an appropriate summary measure.
- Remember, a *disparity* is merely a *difference* between groups; *health inequities* are that subset of disparities that are unjust or unfair.
- Our definition of "unjust and unfair" will drive the indicator we use to measure health inequities.
- For this presentation we confine our consideration of indicators to relative measures only.

Fairness Concept #1

1. Senate-style representation: All groups equal, regardless of population share.





No distinction: Disparity worsens by the same amount regardless of population share.

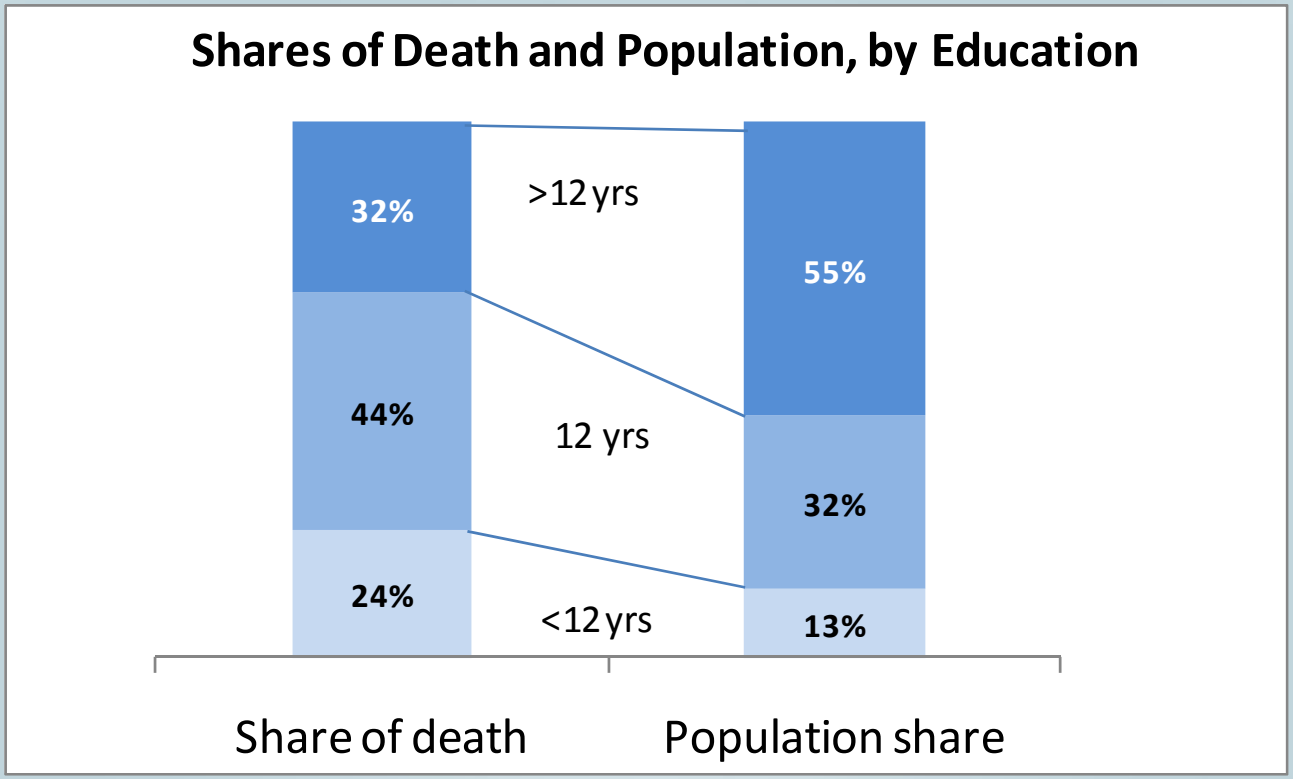
1. Senate-style Measure of Disparity

Index of disparity:

$$[\Sigma \left| r_i - r_{rp} \right| / n] / r_{rp}$$

- Note: using absolute values means that better and worse off groups are treated equally
- Reference point can be chosen as the average, best off, largest population share, or most advantaged group.
- Number of groups compared affects the results
- Since racial classifications are arbitrary—is this the best way to measure health equity?
- Does not include size of population groups

Accounting for population size



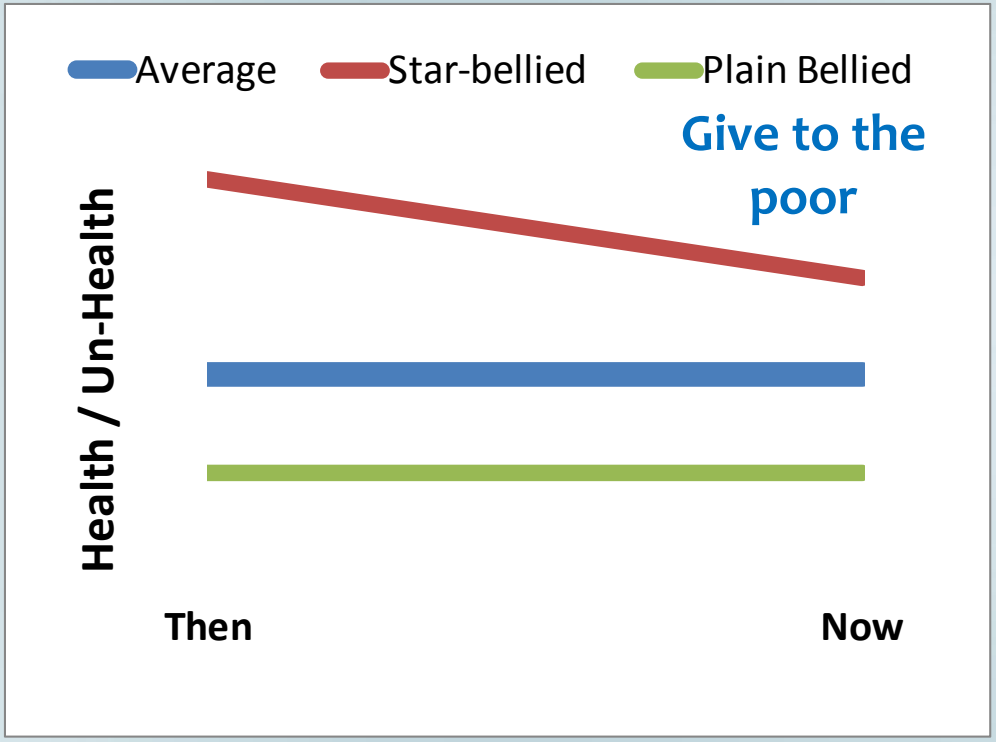
General formula to measure relative disproportionality:

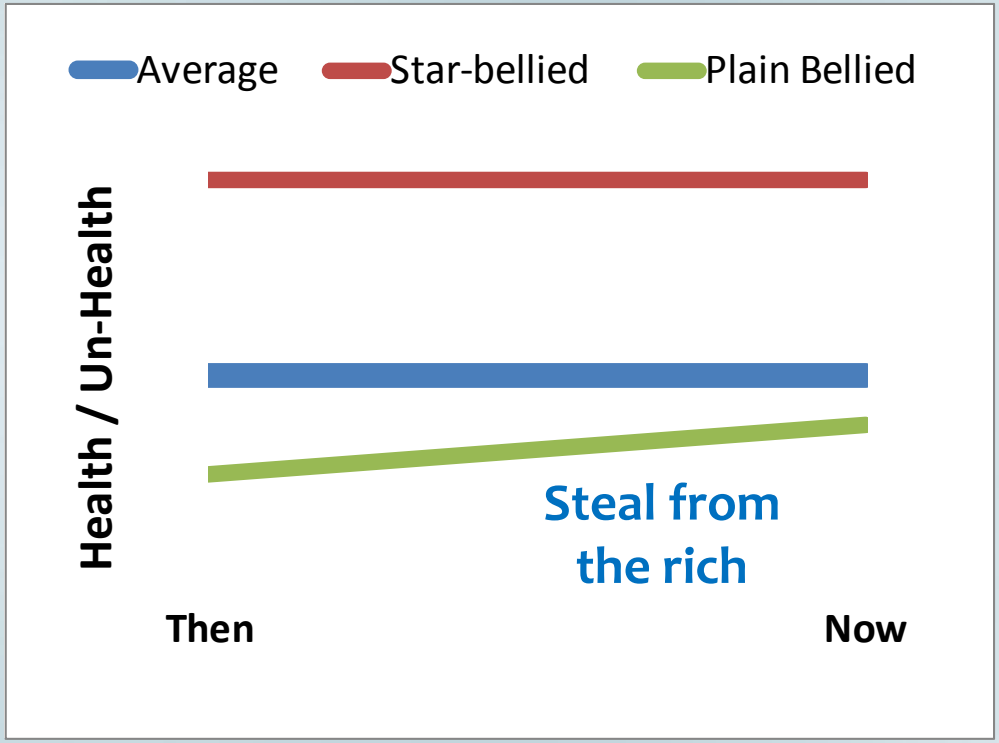
$$\sum p_j \; f(r_j)$$

Where r_j = rate of each group relative to the average rate

Fairness Concept #2

2. Utilitarian – Share the burden equally (Robin Hood)





Disparity partially reduced in both cases;
Both trends needed for fair distribution of resources.

2. Utilitarian Measure of Disparity

Mean Log Deviation *(Measure of disproportionality):*

$$\sum p_j \text{-ln}\,(r_j)$$

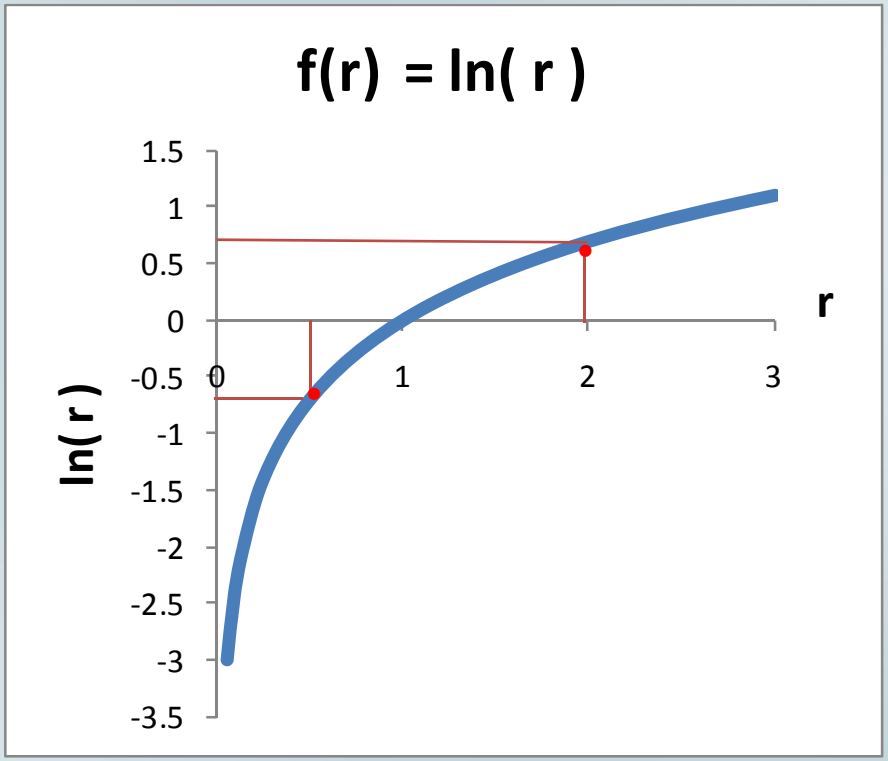
where $r_j = \frac{\text{Rate in Group j}}{\text{Average Rate}}$

- Reference point is overall average
- Weighted by population share
- Measures imbalance around the average
- Equally sensitive to groups with extreme health and groups with extreme un-health.
- Most sensitive to groups with large population share

2. Utilitarian Measure, continued

Mean Log Deviation

$$\sum p_j \text{-ln}\,(r_j)$$



ln (2) =0.693

ln (1/2) = - 0.693

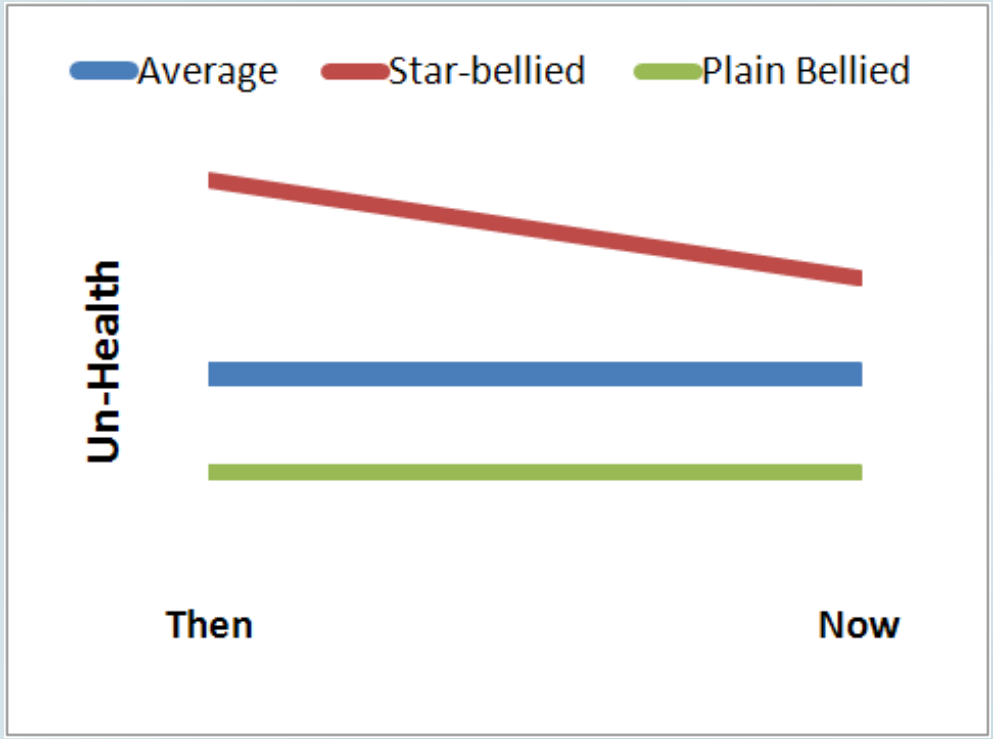
✓If one group is above average, and another is below average by the same proportion, they cancel out – no net ***relative*** disparity.

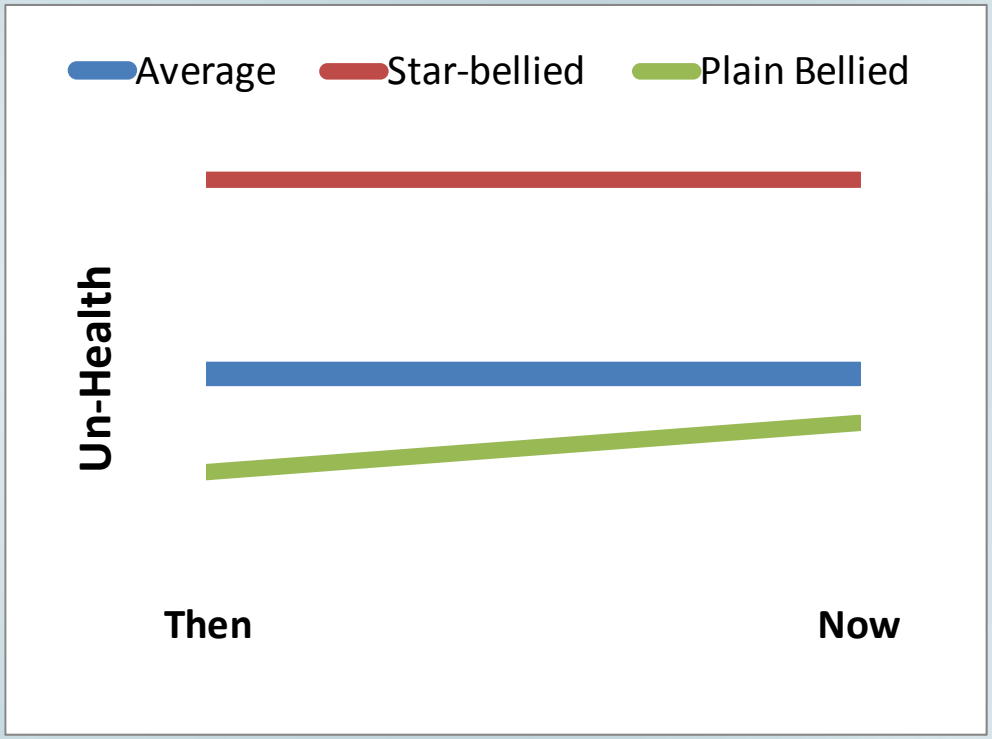
✓Positive index indicates some groups have disproportionately low risk.

✓Negative index indicates groups with disproportionately high risk.

Fairness Concept #3

3. Prioritarian - No one should be left behind. All have a right to the best health possible.



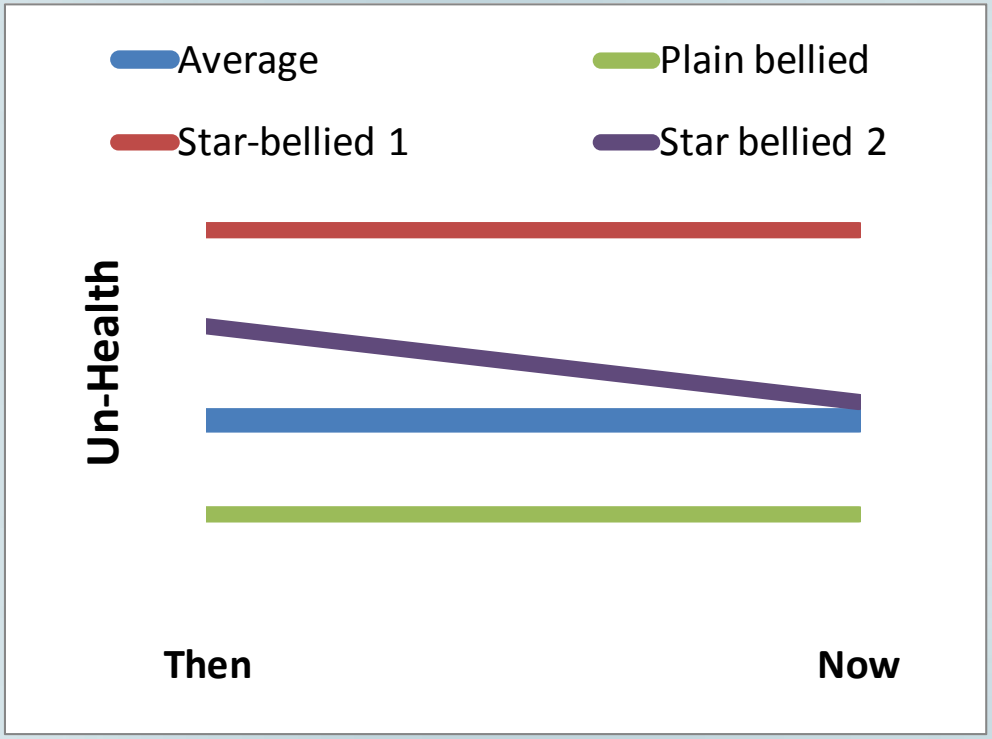


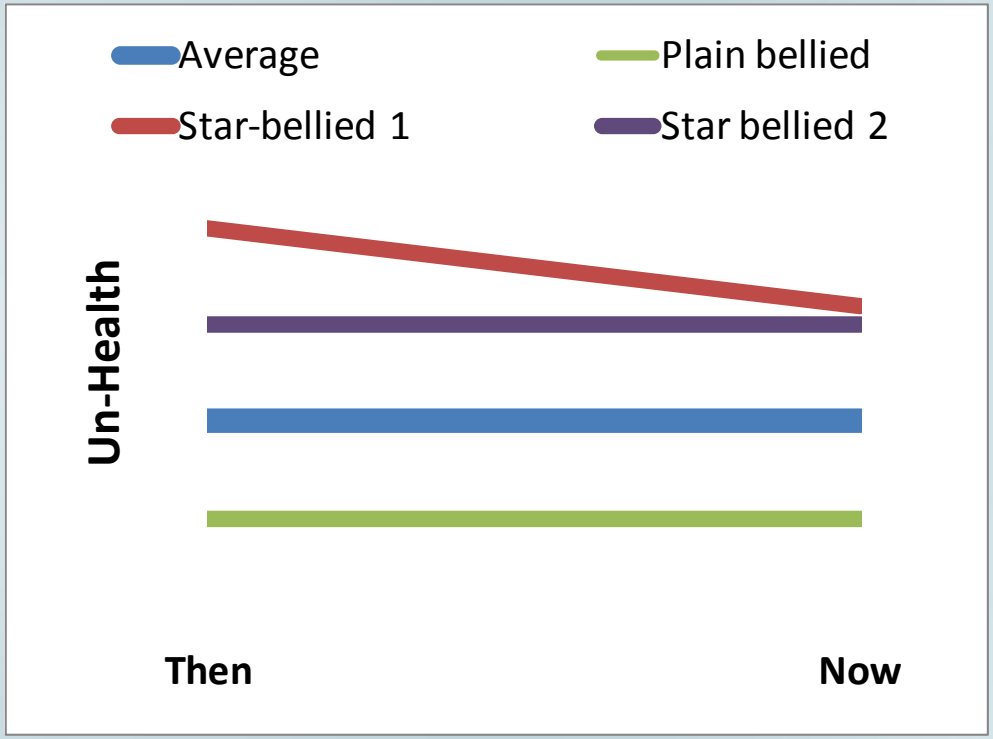
Overall situation improves:
Disparity reduced because sick people become healthier.

Overall situation worsens:
Disparity reduced because healthy people become sicker.

Fairness Concept #3, cont.

3. Prioritarian – pay extra attention to those worst off





Some improvement,
but worst inequity
remains untouched.

More improvement;
Worst inequity is being
addressed first.

3. Prioritarian Measure of Disparity

Theil's Index *(*Measure of disproportionality):

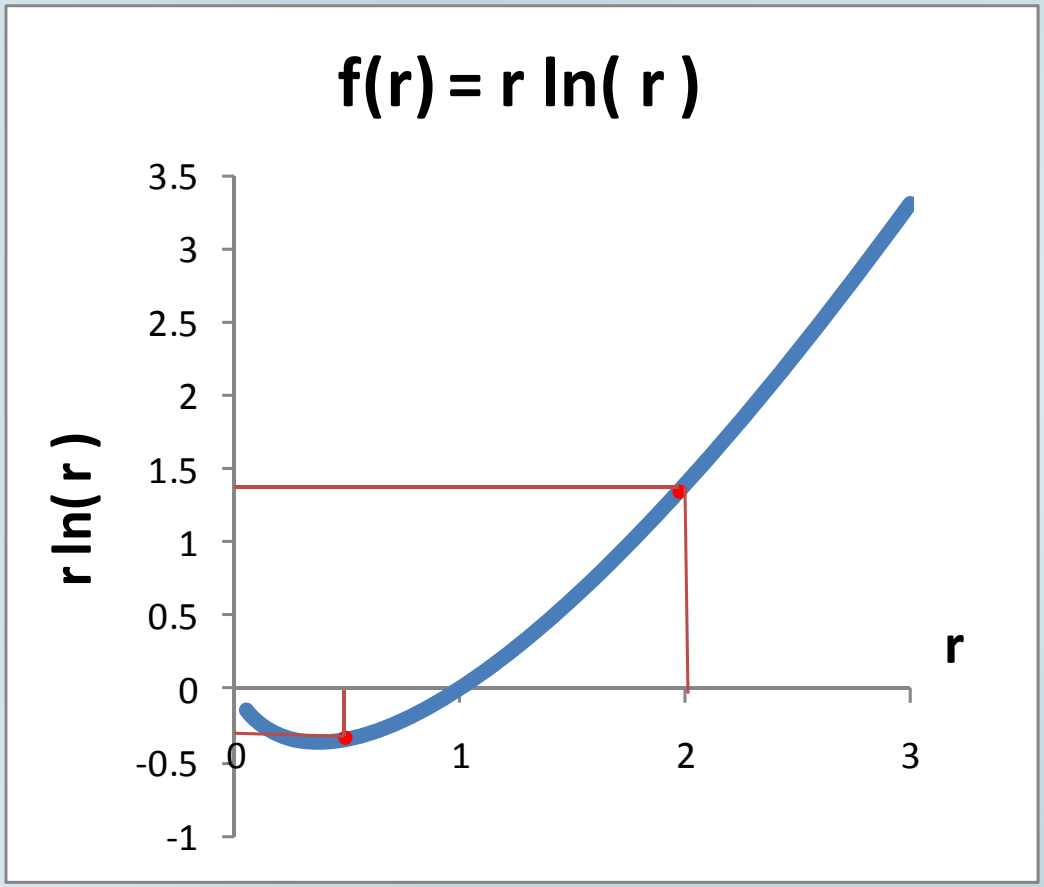
$$\sum p_j \, r_j \ln (r_j)$$

where r_j = Rate in Group j / Average Rate

- Reference group is population average.
- Weighted by population share.
- Extra weight given to groups with above average risk (RR > 1).
- Most sensitive to groups with extremely high relative rates.
- Less weight given to groups with below average risk (RR < 1).

3. Prioritarian Measure, continued

Theil's Index: $\sum p_j r_j \ln(r_j)$

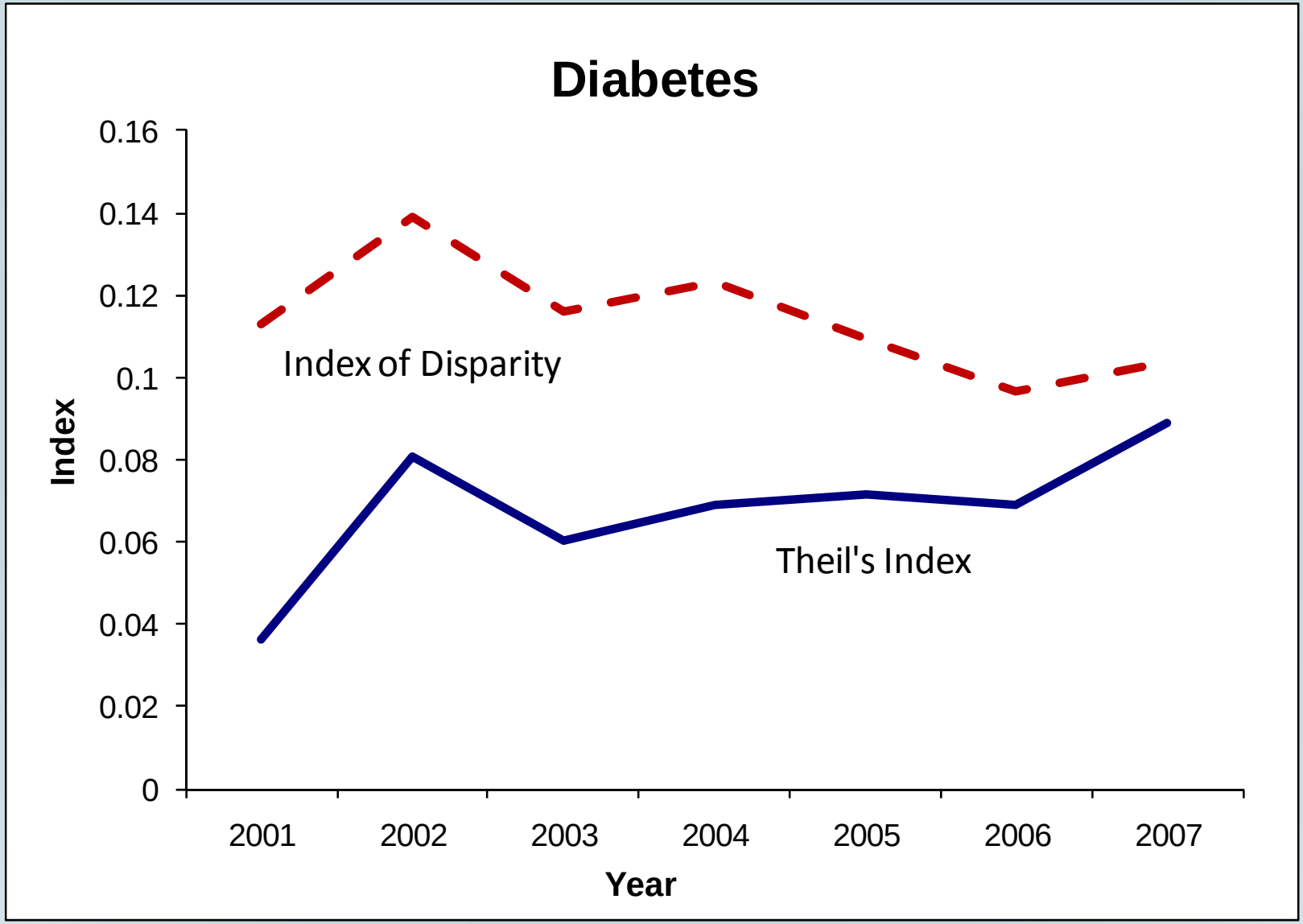


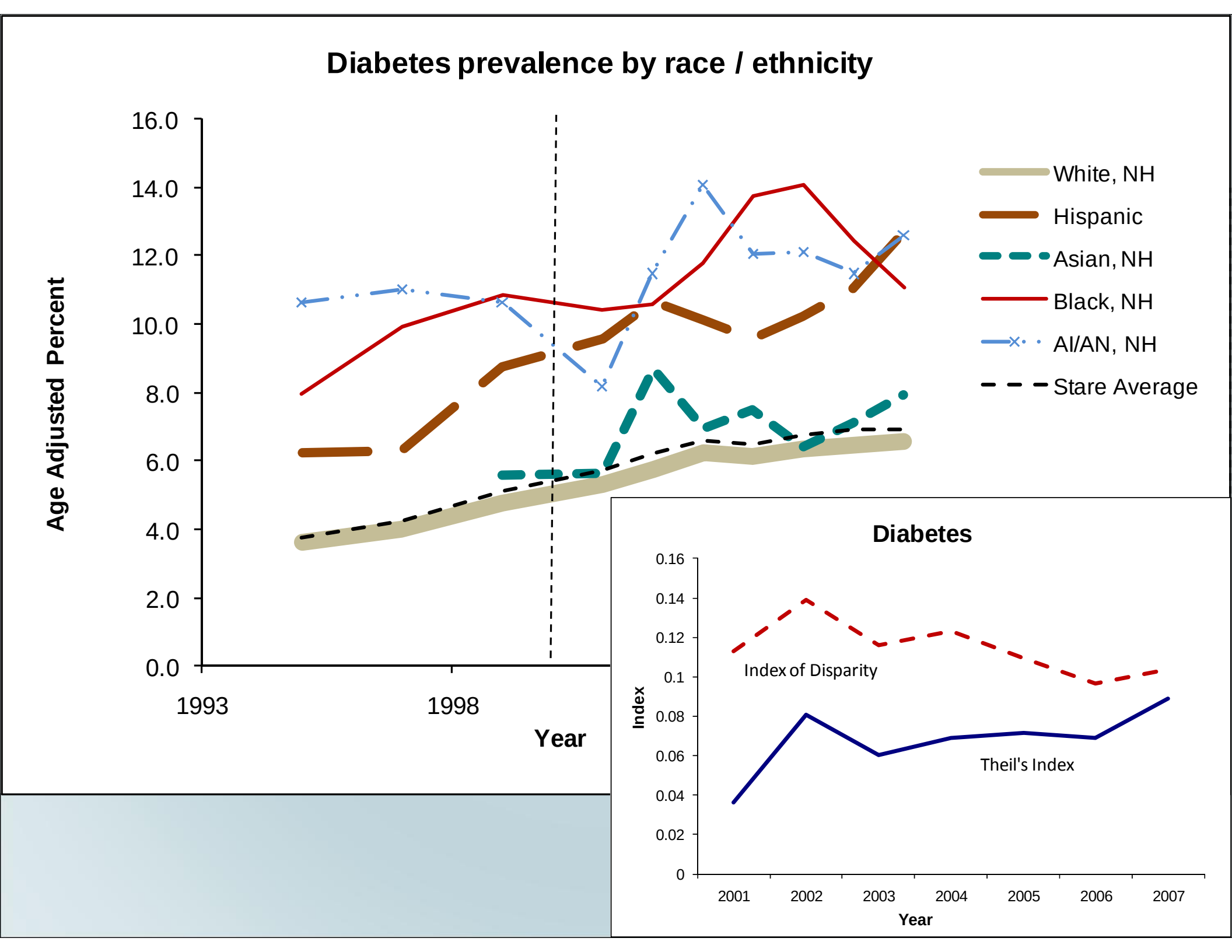
2 ln (2) =1.39

(1/2) ln (1/2) = - 0.347

- Groups with above-average risk count more than groups with below-average risk.
- Groups with very high risk count more than those with middling high risk.
- Note: Need to use an indicator of unhealth (e.g. has diabetes) rather than a measure of health (e.g. Good nutrition).

Comparing Indicies :
Effect of population weighting

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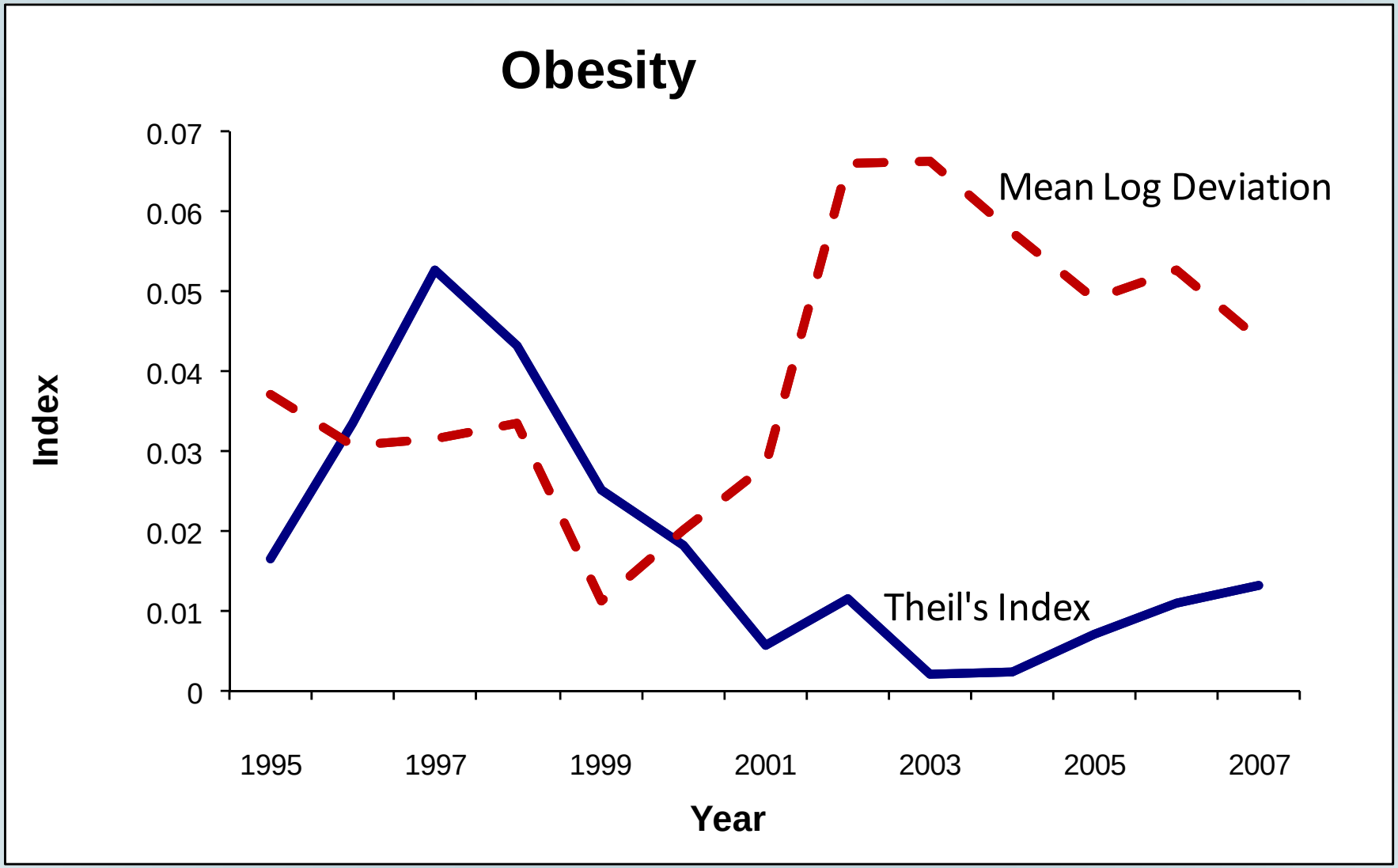
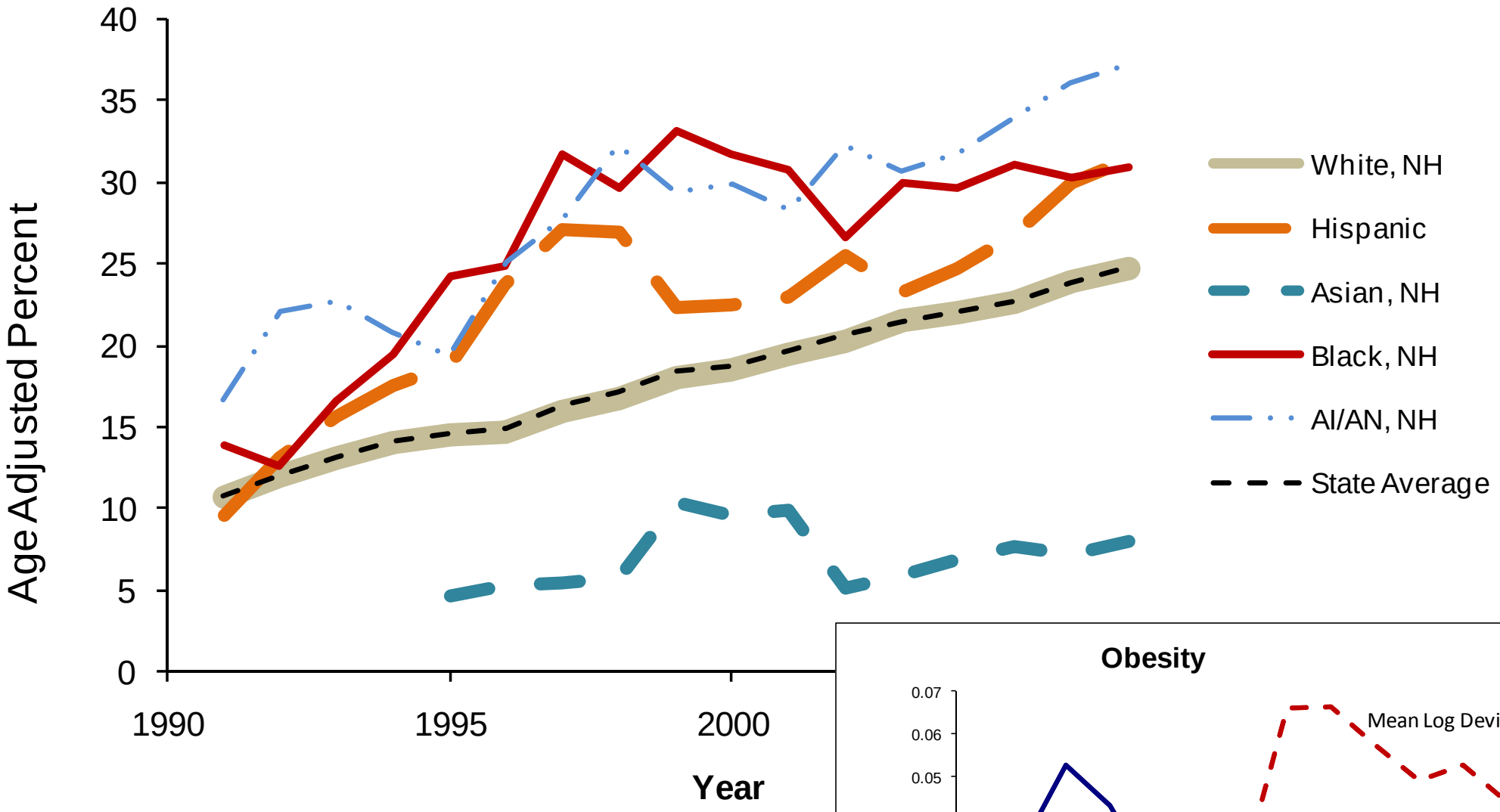
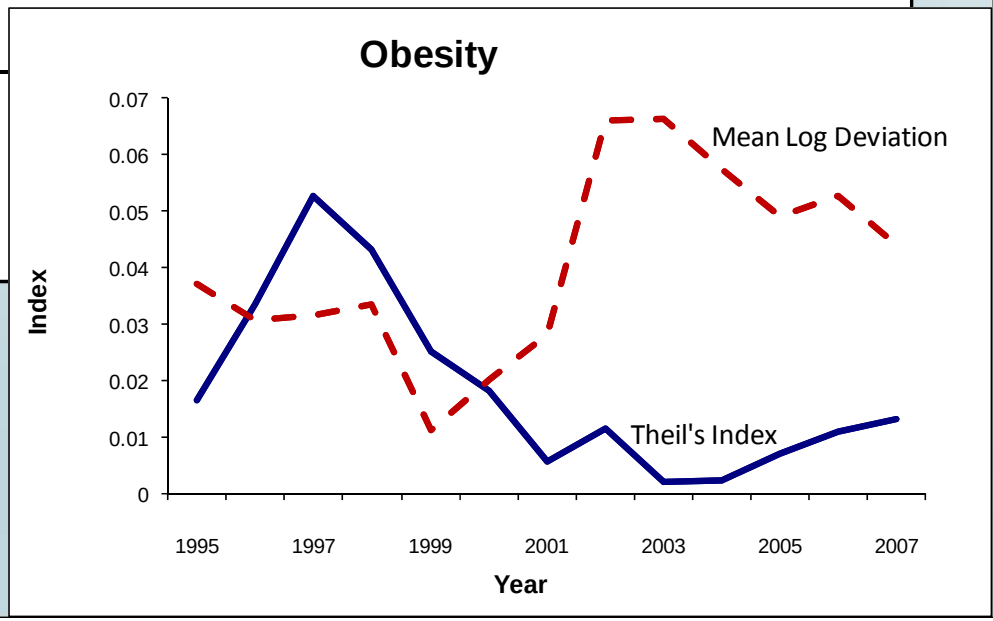
0.0
Age Adjusted Percent
1993
1998
Year
White, NH
Hispanic
Asian, NH
Black, NH
AI/AN, NH
Stare Average
Diabetes
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Index
Index of Disparity
Theil's Index
2001
2002
2003
2004
2005
2006
2007
Year

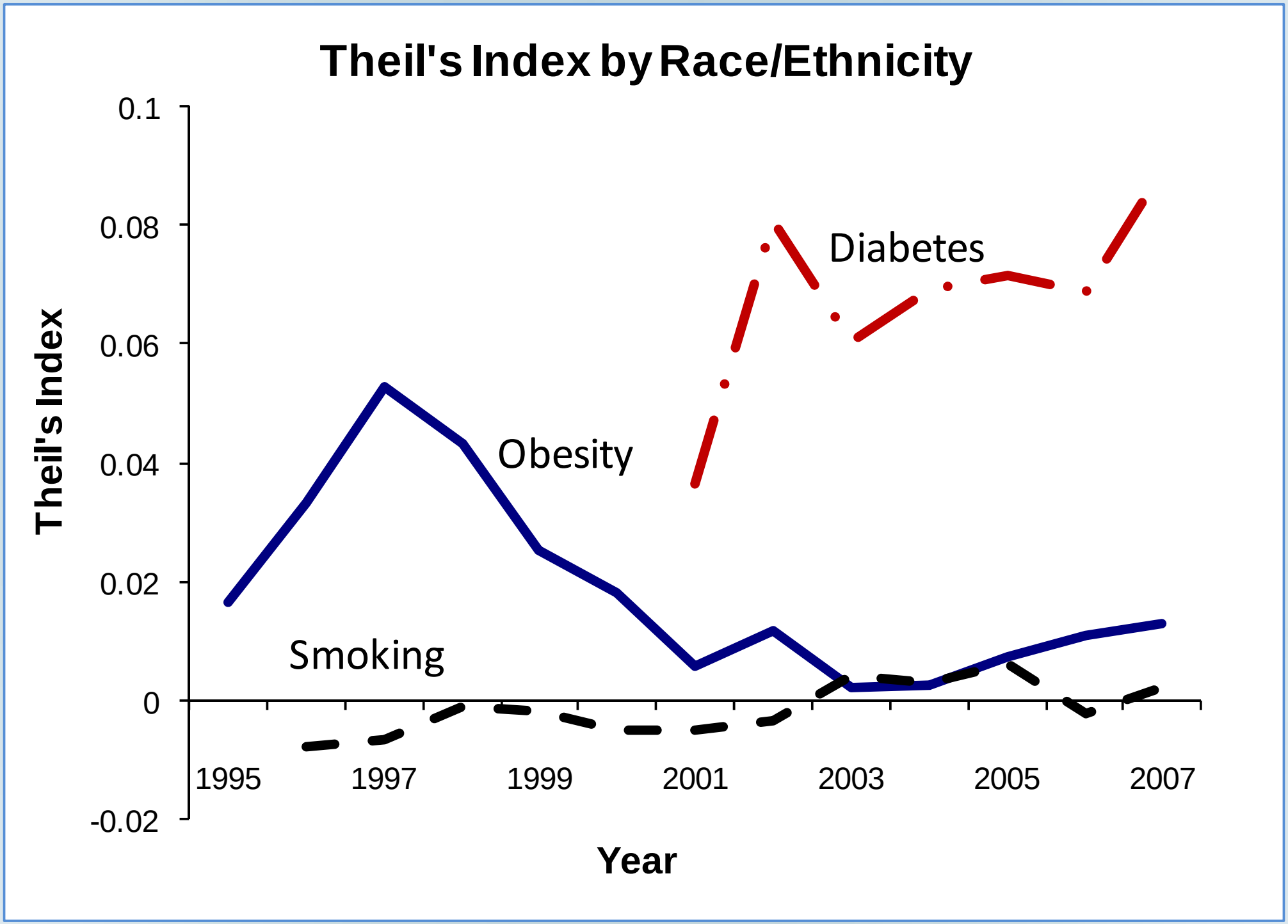
Disproportionality Indices:
Comparing Utilitarian & Prioritarian Approaches



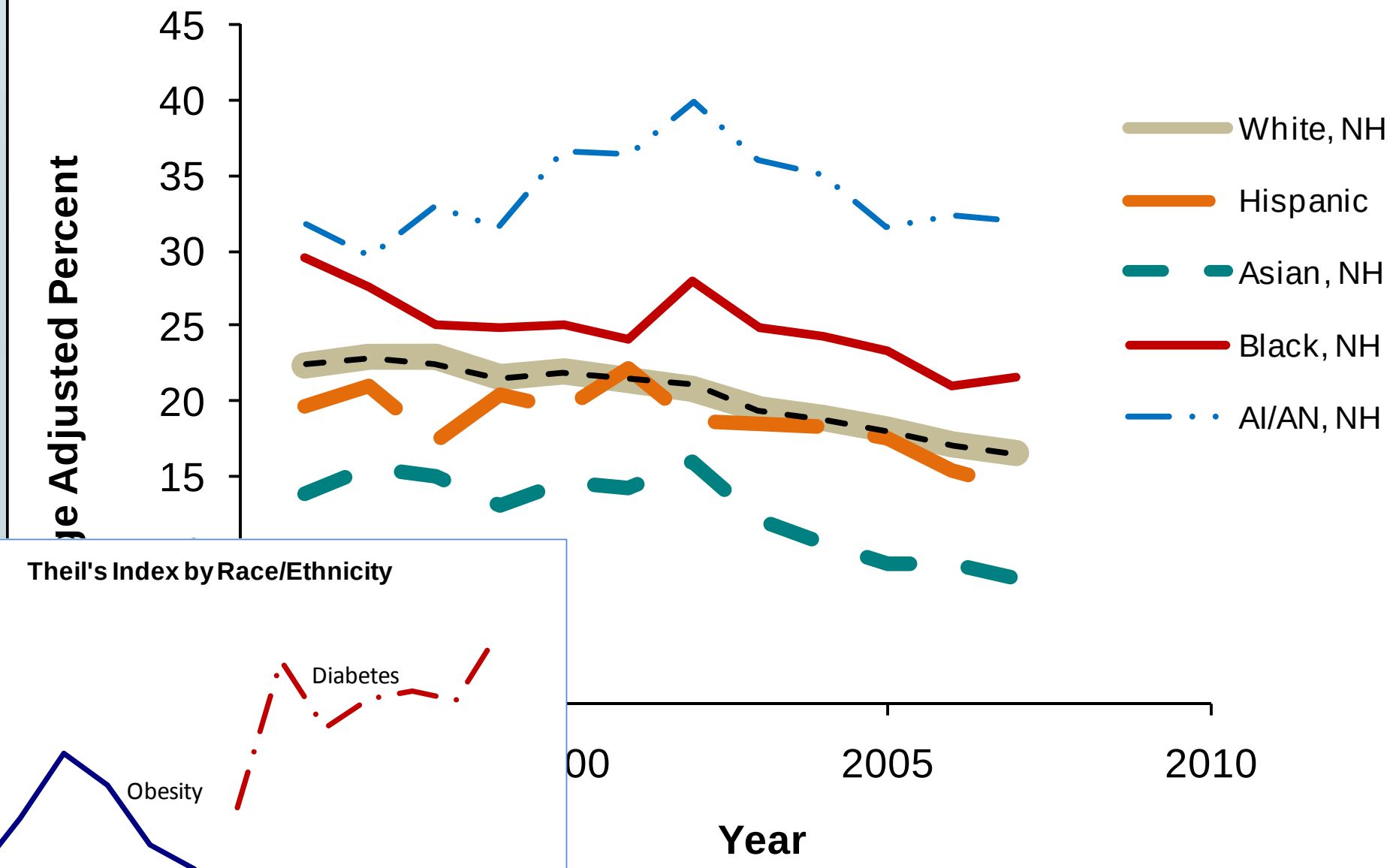
Obesity by Race & Ethnicity






Theil's Index by Race/Ethnicity
0.1
0.08
0.06
0.04
0.02
0
-0.02
Theil's Index
Diabetes
Obesity
Smoking
1995
1997
1999
2001
2003
2005
2007
Year

Smoking prevalence by race / ethnicity



Summary

- Values drive choice of indicator.
  - No one concept of fairness fits all situations.
  - Consider the ethical dimension carefully, then choose an indicator that matches your values.
- Re-examine the original trends in health status.
  - Understand how changes among populations affect indicators.
  - Details may contain important information that is lost in the composite indicator.
- Look at absolute indicators to get the full picture.
  - Relative indicators measure ***imbalance*** in the distribution of disease ***risk,*** and absolute indicators measure the ***magnitude*** of excess disease ***burden***).