Where health disparities begin: the role of social and economic determinants

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A few definitions

- Health disparities: health differences closely linked with social & economic disadvantage
  - adversely affect groups who are at an underlying social disadvantage—e.g., based on race, wealth, gender, disability, LGBT—because of historical discrimination or exclusion
- Health equity: the principle underlying a commitment to eliminate disparities.
  - implies addressing social (including economic) determinants of health, as well as health care
  - Justice
- Social determinants: non-medical factors that influence health and can be shaped by policies; includes economic factors
Infant mortality rate: England and Wales

Age-adjusted mortality by occupation, UK civil servants aged 40-64, Whitehall Study

Life expectancy in US varies by income in a stepwise gradient pattern.

Child health varies by parents’ income (& education): Poor/fair child health reported by parent

Age-Adjusted.
Racial/ethnic differences do not explain differences in adult health by income

<table>
<thead>
<tr>
<th>Income Level</th>
<th>Black, Non-Hispanic</th>
<th>Hispanic</th>
<th>White, Non-Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100%</td>
<td>23.9</td>
<td>19.2</td>
<td>20.9</td>
</tr>
<tr>
<td>100%-199%</td>
<td>18.3</td>
<td>15.6</td>
<td>14.8</td>
</tr>
<tr>
<td>200%-399%</td>
<td>11.2</td>
<td>10.3</td>
<td>7.7</td>
</tr>
<tr>
<td>≥400%</td>
<td>6.8</td>
<td>6.4</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Source: CDC/NCHS, National Health Interview Survey 2010. Age adjusted.
How could income affect health?
A body of literature supports:

Income can shape options for:
- Housing
- Neighborhood conditions
- Diet
- Exercise
- Services (e.g., childcare, transportation, repairs, medical care...) that can alleviate stress
- Most of above can affect stress and thus family stability

Parents’ income shapes the next generation’s:
- Education
- Work
- Income
Income shapes neighborhood options. How could a neighborhood affect health?

- Safe places to exercise
- Access to healthy food
- Ads for harmful substances
- Social networks & support
- Norms, role models, peer pressure
- Fear, anxiety, despair, stress
- Quality of schools
- Racial segregation tracks Blacks & Latinos into poorer neighborhoods than Whites of similar income

The stress-health link: biologically plausible?

- Advances in neuroscience help elucidate how social factors “get into the body”

- HPA axis, sympathetic nervous system, and immune/inflammatory mechanisms have been demonstrated as responses to stress
  - Mediators include cortisol, other stress hormones, cytokines, telomerase

- Chronic stress is a plausible and likely major contributor to both socioeconomic and racial/ethnic inequalities in health
How could stress affect health?

- STRESSOR
- Hypothalamus
  - CRH
- Pituitary Gland
  - ACTH
- Adrenal Glands
  - CORTISOL

Damage to multiple organs & systems → chronic disease, immune suppression, inflammation

Source: Center on Social Disparities in Health, UCSF.
Less income, more stressors
Separation or divorce during pregnancy
(similar patterns for 11 major stressors)

More education, longer life

Educational Attainment:
- Less than high school
- High-school graduate
- Some college
- College graduate

<table>
<thead>
<tr>
<th>Life Expectancy at age 25</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than high school</td>
<td>47.1</td>
<td>51.7</td>
</tr>
<tr>
<td>High-school graduate</td>
<td>51.4</td>
<td>57.0</td>
</tr>
<tr>
<td>Some college</td>
<td>52.3</td>
<td>58.1</td>
</tr>
<tr>
<td>College graduate</td>
<td>56.4</td>
<td>60.3</td>
</tr>
</tbody>
</table>

Source: CDC/NCHS, National Health Interview Survey
Racial/ethnic differences do not explain adult health differences by education

Source: Braveman, Cubbin et al., analyses of BRFSS 2008-2010.
Age-Adjusted.
Both race and socioeconomic factors matter

Education can shape health behaviors by determining knowledge and skills.

- Educational attainment
  - Health knowledge
  - Literacy
  - Problem-solving
  - Coping skills

- Diet
  - Exercise
  - Smoking
  - Health/disease management
Other plausible pathways from education to health, e.g., via work & income

- Educational attainment
- Work
  - Work-related resources
  - Working conditions
- Income
  - Neighborhood/school environment
    - Diet & exercise options
    - Stress
  - Health insurance
    - Sick leave
    - Stress
- Control / demand imbalance
  - Stress

HEALTH
Psychosocial pathways from education to health

Educational attainment

- Social networks
- Control beliefs (powerlessness, sense/locus of control, fatalism, mastery)

Social standing

- Social & economic resources
  - Perceived status
  - Stress

Health

- Social & economic resources
  - Norms
  - Social support
  - Stress

- Coping
  - Response to stressors
How could education affect health?

Educational attainment → Health knowledge, literacy, coping & problem solving

- Diet
- Exercise
- Smoking
- Health/disease management

Educational attainment → Work

- Working conditions
  - Exposure to hazards
  - Control / demand imbalance
  - Stress
- Work-related resources
  - Health insurance
  - Sick leave
  - Stress
- Income
  - Housing
  - Neighborhood environment
  - Diet & exercise options
  - Stress

Educational attainment → Control beliefs

- Coping & problem solving
- Response to stressors
- Health-related behaviors

Educational attainment → Social standing

- Social & economic resources
- Perceived status
- Stress

Educational attainment → Social networks

- Social & economic resources
- Social Support
- Norms for healthy behavior
- Stress
Understanding health disparities across the life course and across generations

1. Social stratification
   - Social position, e.g. by race & class

2. Differential exposure
   - Decreasing exposures
   - Specific exposure
   - Decreasing vulnerability
   - Disease
   - Preventing unequal consequences

3. Differential vulnerability

4. Differential consequences
   - Social consequences of ill health

5. Further social stratification

Adapted from Finn Diderichsen, U. Copenhagen
Childhood social/economic conditions shape adult health

- Adult health is shaped by early experiences
  - Lasting effects of in utero/early childhood deprivation, e.g.,
    - Low SES in adulthood (by limiting education)
    - Neuro-endocrine or immune dysregulation
    - May not be erased by later circumstances

- Chronic stress/deprivation in childhood → chronic disease in childhood and adulthood
  - Critical or sensitive periods

- Cumulative effects of disadvantage
Epigenetics: “Genetics loads the gun. The environment pulls the trigger” (J. Stern)

- Features of social and physical environments can interact with an individual’s genome to influence whether a gene is expressed
- Experience can become biologically embedded -- Some alterations in gene expression are heritable!
- May be important in intergenerational transfer of health risk and social disadvantage
- Policies can alter the social/physical environmental exposures that trigger/suppress gene expression
How early experiences get into the body

Foundations of healthy development and sources of early adversity

Social environment

Physical, chemical, & built environments

Nutrition

Gene-environment interaction

Cumulative effects over time

Physiological adaptations & disruptions

Biological embedding during sensitive periods

Lifelong outcomes

Health-related behaviors

Educational achievement & economic productivity

Physical & mental health

Adapted from Harvard Center on the Developing Child
Residual confounding of observed racial/ethnic differences in health by unmeasured socioeconomic factors & racism-related stress

- At the same education level, whites have more income
- At the same income, whites have more wealth and live in better-off neighborhoods
- At same current SES, whites had higher SES in childhood
- Residual confounding by unmeasured SES -- direct and indirect effects
- And: unmeasured stressors related to racial discrimination
Structural racial bias transmits socioeconomic disadvantage across generations

The legacy of (once-legal) discrimination:
Lower incomes, wealth, education, occupations
And, at a given income or educational level, African Americans and Latinos on average:

- Have less wealth
- Live in under-resourced, often unhealthier neighborhoods
- Were worse off in childhood
- More hardship with fewer resources to cope
- Rarely measured but studies often conclude a racial difference is genetic if it persists after “control for SES”
- Race often captures unmeasured socioeconomic factors
Can racial discrimination harm health in other ways – other than by limiting education, income, wealth...?

- Overt incidents still occur
- But considerable stress even without overt incidents
- Pervasive subtle incidents. Chronic, pervasive concern about being judged or treated unfairly based on race
- Discrimination could affect health through pathways involved in stress; chronic stress is particularly toxic, even in absence of dramatic events
- Internalized racism could harm health by undermining self-esteem and sense of control
Find a way to keep your stress level down. What works for me is making a ton of money & having practically free health care.
Pursuing health equity: Understanding the role of social factors

- Policies to promote child and youth development and education, infancy through college
- Policies to promote economic development and reduce poverty, and reduce racial segregation
- Policies to promote healthier homes, neighborhoods, schools and workplaces

Interactions between genes and experiences

Economic & Social Opportunities and Resources

Medical Care

Behaviors

Living & Working Conditions in Homes and Communities

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