Population Health and Health Disparities -

A Social Epidemiology Perspective

Health Disparities Symposium 2003, University of Washington

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“The goal of the 2003 Health Disparities Symposium: Social Determinants: Methods and Practice is to expose faculty and students to research on health disparities and the social determinants of health.”
“social determinants”

“population health”

and

“health disparities”
US Infant Mortality over the 20th Century

Attempt to understand the “social determinants” of this marker of “population health”
Black – White Disparity in Infant Mortality over the 20th Century
Infant Mortality

- “Population Health” → Improved in all race/ethnic groups
- “Absolute Health Disparity” → Reduced
- “Relative Health Disparity” → Increased
With thanks to:

George Davey Smith, Bristol
Steve Kunitz, Rochester
Yoav Ben-Shlomo, Bristol
Chris Power, UCL, London
Vladimir Shkolnikov, Rostock
Johan Hallqvist, Karolinska, Stockholm
Pernille Due, Copenhagen
Nancy Ross, McGill, Canada
Sam Harper, Michigan
Trivellore Raghunathan, Michigan

Dave Leon, LSHTM, London
Simon Szreter, Cambridge
Di Kuh, UCL, London
David Blane, London
Tony McMichael, Canberra
Juan Merlo, Lund, Malmo
Finn Diderichsen, Copenhagen
Michael Wolfson, Stat. Canada
George Kaplan, Michigan
Richard Cooper, Loyola
<table>
<thead>
<tr>
<th>Part 1.</th>
<th>A brief overview of social epidemiology</th>
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<td>Part 2.</td>
<td>Does an appreciation of social factors actually improve our understanding of population health?</td>
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Part 1. A brief overview of social epidemiology

- One person’s view
You will find examples of studies of social factors and health in many disciplines

Psychology
Sociology
Demography
Economics
Politics - Public Policy
Urban Planning
Disciplinary Perspectives on Health and Health Inequalities

- **Politics**
  - Characteristics of Political Systems
  - Characteristics of Individuals
  - Health

- **Psychology**
  - Characteristics of Economic Systems
  - Characteristics of Individuals
  - Health

- **Economics**
  - Characteristics of Social Systems
  - Characteristics of Individuals
  - Health

- **Sociology**
  - Characteristics of Social Systems
  - Characteristics of Individuals
  - Health

- **Epidemiology**
  - Characteristics of Social Systems
  - Characteristics Of Individuals
  - Health
Modern Epidemiology

Causes

Structural Epidemiology
Political Economy

Psychology Sociology

Behaviour

Genetics Biology

Proximal

Psychosocial Epidemiology

Behavioral Epidemiology

Modern Epidemiology

Disease

Social Epidemiology

Risk Factor Epidemiology

Direct Stress Pathway
The Scope of Social Epidemiology

Social Structure

Why are we interested?

Individual Social Position

Psychosocial Behavioral Factors

Biological Factors

Morbidity Mortality

Adapted from Diderichsen (1997)
Epidemiological Footprint of different Social Structures

Geoffrey Rose

Determinants of individual cases

vs

Determinants of population rate


Figure 1: Rates of homicide in Chicago and England and Wales by age and sex of perpetrator
Income Inequality and Working-Age Mortality
528 Metropolitan Areas in Five Countries, 1990/91

Ross, et al (in press)
The Scope of Social Epidemiology

Social Structure

Social Position

Psychosocial Behavioral Factors

Why are we interested?

Biological Factors

Morbidity Mortality

Adapted from Diderichsen (1997)
Socioeconomic Position is a Powerful Risk Factor

Relative Hazard: CVD Mortality

KIHD Study, 1984-1996
The Scope of Social Epidemiology

Social Structure

Social Position

Why are we interested?

Psychosocial Behavioral Factors

Biological Factors

Morbidity

Mortality

Adapted from Diderichsen (1997)
Hopelessness and CVD Mortality

Education and Smoking During Pregnancy
Among Mothers Aged 20 or Older - USA 1996

NCHS (1998)
In 1995, the NCHS conducted a study on the relationship between income and sedentary behavior in adolescents in the USA. The study found that boys and girls from different income levels had varying percentages of sedentary behavior.

- **High Income**: Lower percentages of sedentary behavior.
- **Middle Income**: Moderate percentages of sedentary behavior.
- **Near Poor**: Higher percentages of sedentary behavior.
- **Poor**: Highest percentages of sedentary behavior.

The data shows a clear trend where income levels correlate with sedentary behavior, with lower income groups engaging in more sedentary activities.

NCHS (1998)
The Scope of Social Epidemiology

Social Structure

Social Position

Psychosocial Behavioral Factors

Why are we interested?

Biological Factors

Morbidity Mortality

Adapted from Diderichsen (1997)
Income and Biological Risk Factors (KIHD 1990)

**Apo A1**
- Income Quintiles
- Graph showing data points in different color bars for each quintile.

**Apo B**
- Income Quintiles
- Graph showing data points in different color bars for each quintile.

**Fibrinogen**
- Income Quintiles
- Graph showing data points in different color bars for each quintile.

**Fasting Glucose**
- Income Quintiles
- Graph showing data points in different color bars for each quintile.
Body Mass Index by Social Class at Birth

The Landscape of Social Epidemiology

Social Structure
- Income inequality
- Residential segregation
- Social capital

Social Position
- Class
- Race
- Gender

Psychosocial Behavioral Factors
- Support, trust, depression
- Smoking, diet, physical activity

Biological Factors
- Genetic influences

Macro-biological processes of growth and development, reproductive maturation, lipids, insulin resistance, clotting factors, P-N-E, immune function

Morbidity Mortality
Political Economy

- History
- Culture

Discrimination

- Institutions

Institutions

- Macrosocial Factors

Structural

- Distal Social Connections

Proximal Social Connections

- Work

Individual Characteristics

- Genetic Characteristics

Pathobiology

Lifecourse

Health Status

- Conception
- Old Age

Lynch (2000)
Lifecourse multi-time point exposures

Mechanisms

biological, behavioral, psychological translation

Context multi-level exposures

Health and Health Inequalities at the Individual and Population Levels
Part 2. Does an appreciation of social factors actually improve our understanding of population health?

A “social” epidemiology of the Russian Mortality Crisis
A. What are the overall population patterns?
Convergence of Life Expectancy at Birth in Industrialized Countries

Caselli (2002)
Recent divergence between industrialized countries

Caselli (2002)
Contrasting Trends in Life Expectancy

Meslé (2002)
B. Does the pattern differ by age?
Age Contribution to Russian Life Expectancy Decline

<table>
<thead>
<tr>
<th>Age, y</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
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<tbody>
<tr>
<td></td>
<td>Years</td>
<td>Percent</td>
<td>Years</td>
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<tr>
<td>All ages</td>
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<td></td>
<td></td>
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<tr>
<td>0</td>
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<td>15-24</td>
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<td>5.1</td>
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<td>25-34</td>
<td>0.59</td>
<td>65%</td>
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<td>35-44</td>
<td>1.01</td>
<td>19.5</td>
<td>1.32</td>
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<td>45-54</td>
<td>1.26</td>
<td>24.5</td>
<td>1.55</td>
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<td>55-64</td>
<td>1.03</td>
<td>19.9</td>
<td>1.17</td>
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<td>65-74</td>
<td>0.58</td>
<td>11.2</td>
<td>0.57</td>
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<tr>
<td>75-84</td>
<td>0.24</td>
<td>4.6</td>
<td>0.16</td>
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<tr>
<td>≥85</td>
<td>0.07</td>
<td>1.4</td>
<td>0.02</td>
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</table>

Notzon et al., JAMA, 1998

1990-1994
C. Does the pattern differ by cause?
Cause-specific Mortality: Russia 1984-1994

## Causes of Death Contributing to Russian Life Expectancy Decline

<table>
<thead>
<tr>
<th>Cause</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Years</td>
<td>Percent</td>
<td>Years</td>
</tr>
<tr>
<td>All causes</td>
<td>−5.16</td>
<td>100.0</td>
<td>−6.05</td>
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<tr>
<td>Infectious diseases</td>
<td>−0.12</td>
<td>2.4</td>
<td>−0.17</td>
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<tr>
<td>Diseases of the heart</td>
<td>−1.35</td>
<td>26.1</td>
<td>−1.56</td>
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<tr>
<td>Cerebrovascular diseases</td>
<td>−0.49</td>
<td>9.6</td>
<td>−0.45</td>
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<tr>
<td>Malignant neoplasms</td>
<td>−0.04</td>
<td>0.7</td>
<td>0.00</td>
</tr>
<tr>
<td>Pneumonia and influenza</td>
<td>−0.17</td>
<td>3.4</td>
<td>−0.24</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>1.2</td>
<td>−0.09</td>
<td>1.5</td>
</tr>
<tr>
<td>Chronic liver diseases and cirrhosis</td>
<td>2.4</td>
<td>−0.13</td>
<td>2.1</td>
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<tr>
<td>Other alcohol-related causes</td>
<td>9.6</td>
<td>−0.61</td>
<td>10.2</td>
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<td>Motor vehicle crashes</td>
<td>−0.01</td>
<td>0.1</td>
<td>0.00</td>
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<tr>
<td>Other injuries</td>
<td>−0.92</td>
<td>17.8</td>
<td>−1.17</td>
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<tr>
<td>Suicide</td>
<td>−0.27</td>
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<tr>
<td>Homicide and legal intervention</td>
<td>−0.33</td>
<td>6.3</td>
<td>−0.42</td>
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<tr>
<td>Remainder</td>
<td>−0.79</td>
<td>15.2</td>
<td>−0.80</td>
</tr>
</tbody>
</table>

Notzon et al., JAMA, 1998

1990-1994

~ 70% CVD
Accidents
Injury
Violence
D. What does our knowledge of the individual level risk factors tell us?
What could cause a big rise in CVD mortality?

Artifact of death registration

Collapse of health care

Hypertension

Smoking

Obesity

Lipids – Diet

Physical activity

Alcohol
“Although factors such as nutrition and health services may be involved, the evidence is that substantial changes in alcohol consumption over the period could plausibly explain the main features of the mortality fluctuations observed.”

Coronary heart disease and acute alcohol poisoning mortality in Russia, Men 30-59
Injuries, poisoning and violence mortality, Men aged 30-59 (excluding acute alcohol poisoning)

Very little time lag

Anti-alcohol Campaign

Age-standardised rate per 100,000

Per capita consumption litres pure alcohol/year

Injury/violence mortality rate

Alcohol consumption
But ...

Isn’t alcohol protective for heart disease?
Beer Bingeing and Mortality - Finland


* Adjusted for average consumption
Correlates of Alcohol Bingeing in Finnish Men - KIHD

- poor childhood
- low education
- blue-collar job
- low income
- smoking
- poor lipid profile
- higher blood pressure
- low physical activity
- hopelessness
- depression
- cynical hostility
E. How does all this fit with our knowledge of the pathophysiology of the particular outcome?
Coronary heart disease mortality in Russia

- **CHRONIC** component:
  classic atherosclerotic/thrombotic pathology
  associated with known coronary risk factors

- **ACUTE** component:
  alcohol induced arrhythmias cardiomyopathies
  associated with binge drinking
F. Putting together a plausible population health story that incorporates the social to the biological
“These findings paint a picture of societies in which young and middle aged men face social and economic disruption on a large scale, for which they are poorly prepared. For many, their options are constrained by low levels of education, and the societies of which they are a part have few systems of social support.

Poor nutrition and high rates of smoking have already reduced their chances of a long life. The availability of cheap alcohol, however, provides a pathway not only to oblivion but often to premature death.”

McKee and Shkolnikov BMJ (2001)
Social Stress

% Fall in Male Life Expectancy and Labor Market Turnover

Russia 1990-94


% fall in men's life expectancy

Sum of hirings and redundancies/1000 employees
A Model for Social Epidemiology
Culturally contextualized - specific exposures - susceptibilities - outcomes

**Specific Exposure:** Binge drinking

**Socioeconomic position**

**Specific Outcomes:**
- CVD
- Accidents / Violence

**Structures exposure probabilities to binge drinking**

**Social and Structural Upheaval**

**Decreased Life Expectancy**

Cultural Component – role of alcohol in “vodka belt” culture
Part 3. What are some of the lessons for better understanding the social determinants of population health?

- Considering specificity in our explanations
Trends in selected causes of death for women aged 30-59, Russia 1965-1999

Shkolnikov, McKee & Leon, Lancet 2001
Reinstate Specificity

“No, some of our epidemiologic forefathers did not get the notion of ‘specificity’ quite right. But I suggest that a modified version of that notion has a useful place, after all, as we seek to sort out causal from non-causal associations.” p. 7

- Specificity of Exposure – an outcome associated with 1 exposure, not another
- Specificity of Outcome – an exposure associated with 1 outcome, not another
- Specificity of Susceptibility – association only in those susceptible to the effect

Why might specificity of outcome-exposure links be useful in understanding the social causation of disease?

- It may give greater flexibility and explanatory power because it helps shift our focus toward an understanding of population health and health disparities, as rooted in the social and structural distribution of more specific exposures that affect specific susceptibility to particular outcomes.
Why might specificity of outcome-exposure links be useful in understanding the social causation of disease?

- This means understanding that the social and structural distribution of relevant risk factors is often contextualized in regard to time, space, culture and population subgroup.
Recent divergence between industrialized countries

Caselli (2002)

Why does Japan have the highest life expectancy in the world?
Some have used this remarkable growth in life expectancy as evidence for the importance of social cohesion / social capital and related psychosocial processes.

Lower inequality (income) blunts perceptions of relative disadvantage $\rightarrow$ greater social cohesion $\rightarrow$ less stress mediated disease.
Why does Japan have the highest life expectancy in the world?

“... these improvements cannot be explained in terms of changes in nutrition, health care, preventive health policies, or any of the obvious factors, ...” p. 18

“What is important about the Japanese example is . . . the association of a narrow income distribution with a public sphere of life which has a real social content. Instead of a moral and social vacuum mediated only by market relationships, life beyond the family has a well-developed social structure.” p. 133

What if we consider the specific components of the rise in Japanese life expectancy?
* Stomach cancer was the leading single cause of cancer mortality in all these countries in 1950.
20th Century Trends in Infant, Neonatal and Under 5 Mortality, Japan

Vital Statistics

© T Hasegawa
NIHSM, Japan
Infant Mortality and Education of Women, Japan 1899-1943
Infant mortality 1921-23 against stomach cancer mortality 1991-93 for men aged 65-74 in 27 countries

Leon and Davey Smith, BMJ (2000)
**Trends in Stomach Cancer, 1950-1995**

- Stomach cancer was the leading single cause of cancer mortality in all these countries in 1950.

* Stomach cancer begins to decline in cohorts born around the turn of the century.
Japanese Life Expectancy - The Real Story?

- By 1900 - Systematic investments in education of women, improvements in urban living, sanitary conditions especially for children ➔ less infectious burden

- 1920s - The children of those women were the first generations to experience lower infant mortality – a marker for the health generating potential of early life environment

- Stomach cancer and hemorrhagic stroke - both causes dependent on early life conditions / infection - decline enormously after WW2
Prolongation of Life Expectancy 1965-1985
Age & Disease Group by Polard’s Method

Hemorrhagic Stroke

© THasegawa
NIHSM, Japan
Japanese Life Expectancy - The Real Story?

- Enormous declines in hemorrhagic stroke and stomach cancer, but Japan also avoids the “epidemic” of CHD experienced in the West and Soviet Union

- The huge economic advances post WW2 are NOT converted into increases in CHD as in the West – despite high smoking rates post WW2 – low fat diet?

- But the future looks less bright as LE will likely stall or may actually decline as lung cancer rates climb rapidly – 40 to 50 years after smoking taken up in great numbers
• Levels of social cohesion may well have been important in facilitating these massive social changes but they were not directly responsible for these unprecedented improvements in population health in Japan - due to ↓ stomach cancer and hemorrhagic stroke

• There were more specific social investments in the health of women and children and urban sanitation

• Nor is it likely that these investments were rooted in ideas about improving social equity
• More likely based on paternalistic views of the importance of good maternal-child health conditions to future generations and how that would feed into the aspirations of the Japanese imperial state

• Whatever the motivation, the specific social investments in women and children have helped deliver the highest life expectancy on the planet, despite on-going gender inequities in Japan

• No universal pathway to good population health?
• Should good population health trump other social values?
Factors - like social capital/cohesion and stress - that may seem plausible (both biologically and socially) in the cross-section sometimes fail to generate less support a) when longer term trends in exposures and outcomes are studied
and/or

b) when the specific patho-physiology of the disease in question is more fully understood.
Disease that have historically been linked to stress processes

- Cholera
- Pellagra
- Beri Beri
- Down’s syndrome
- Scurvy
- Yellow fever
- Typhoid
- Asthma
- Peptic ulcer
The mid-20th Century Epidemic of Peptic Ulcer

Susser and Stein. Lancet (1962)
Peptic Ulcer and Stressful Life Events

Men
Any stressful events, OR = 20.3

Women
Any stressful events, OR = 21.5

“During convalescence the patient should be given a simple exposition of peptic ulcer. A clear understanding of the need for maintaining a calm outlook on life, and of the necessity for not exceeding his natural “tempo” by accepting too much work or responsibility, will be much more valuable than routine medication. The patient has got to live with his ulcer-forming tendency and it is essential to give him all the information at our disposal.”

F. Avery Jones. *Progress in Clinical Medicine*, 1948
“The diet should be served in as colourful and attractive a way as possible. A bland insipid colourless diet may cause less psychic flow of gastric juice, but it makes the patient depressed and irritable. The sustained resentment is more harmful than the increased psychic secretion.”

F. Avery Jones. In: *Progress in Clinical Medicine*, 1948
“That there has been a true decline in incidence is the most interesting possibility. This would suggest to anyone in sympathy with ‘psychosomatic’ theories ... that the type of personality disposed to the disease is less common – unfortunately not a testable proposition; [or] that the environment is less of a strain – which is scarcely conceivable”.

What causes peptic ulcer?

“... despite the common folk knowledge about the emotional causes of ulcer, a major textbook of pathology currently concludes that the origins of peptic ulcers are ‘enigmas wrapped in mystery’ “.

Sterling and Eyer. Biological basis of stress related mortality.

The evidence “. . . does not exclude the possibility that a major single causal factor awaits discovery”

Mervyn Susser. *Journal of Chronic Disease* 1967;20:435-456
What causes peptic ulcer?

Helicobacter Pylori
“H pylori eradication, without altering acid output, will become the mainstay of duodenal ulcer treatment because it cures the disease.”

Part 4. What are some of the lessons for better understanding social disparities in health?

- Considering heterogeneity in our explanations
"Socioeconomic status is a strong and consistent predictor of mortality and morbidity. Individuals lower in the SES hierarchy suffer disproportionately from almost every disease ... This association is found with each of the key components of SES: income, education and occupational status."


"Throughout history SES has been linked to health. Individuals higher in the socioeconomic hierarchy typically enjoy better health that do those below; SES differences are found for rates of mortality and morbidity from almost every disease and condition."

Adler, et. al., Am Psychologist (1994) p. 15
This sort of mind-set has encouraged a focus on universal processes that make the disadvantaged “generally susceptible” to all sorts of poor health conditions

- John Cassell’s – the “father” of US social epidemiology - ideas on social support and general susceptibility have been influential

- Ideas on general susceptibility have been combined with later evidence (e.g., Whitehall studies) on the apparent inability of material conditions; and traditional risk factors and behaviors to explain socioeconomic gradients in CHD
For example, in regard to the Whitehall study, it has been argued that a “. . . gradient in mortality among civil servants who are not poor argues for the importance of psychosocial factors linked to position in the hierarchy.”

As predicted, the specific psychosocial work characteristic of low control made an important contribution to the social gradient in incident CHD in the Whitehall II study."

"... work is the major cause of the social gradient in CHD incidence in this cohort, ..."

"Much of the inverse social gradient in CHD incidence can be attributed to differences in psychosocial work environment."

Explanations for Health Disparities

- Materialist
  - "objective" conditions & life circumstances

- Behavioral
  - diet, smoking, exercise, alcohol

- Psychosocial
  - stress, negative emotions, control, social support account for the general susceptibility of the disadvantaged
Perceptions of Disadvantage

Assumption - of “general susceptibility” to poorer health among the disadvantaged

Psychosocial Environment

Stress

Social Support

Social Capital

Control

P – N – E – I

Biology
Heterogeneity of links between socioeconomic factors and different outcomes?
Heterogeneity and History
Life Expectancy at Birth - Britain (1540-1901)

Social Advantage = \downarrow LE

Equality

Social Advantage = \uparrow LE

Kunitz, (1987)
“… in early modern Europe rulers and their subjects seem to have had similarly low levels of life expectancy at birth (30-35 years) at least before 1700. Some low-income peasant families had substantially higher levels of life expectancy at birth than wealthy peers (40-50 years) although some had lower (20-25 years). … what matters most to explaining pre-transition mortality is location not income.”

Johansson (1999)
Trends in Death Rates for Selected Occupations, 1861-1911

Woods and Williams (1995)
Census Linkage Study of 15 million individuals

Heterogeneity of
Race / Ethnic Disparities in Health
# Mortality Unrelated to Race, 1979-89

## Women

<table>
<thead>
<tr>
<th>Disease</th>
<th>Age strata</th>
<th>Estimated Hazard</th>
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<tbody>
<tr>
<td>Oral CA</td>
<td>1.26</td>
<td></td>
</tr>
<tr>
<td>Colon CA</td>
<td>1.12</td>
<td></td>
</tr>
<tr>
<td>Rectal CA</td>
<td>1.21</td>
<td></td>
</tr>
<tr>
<td>Pancreatic CA</td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>Lung CA</td>
<td>1.03</td>
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<td>Breast CA</td>
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<td>Ovarian CA</td>
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<td>Bladder CA</td>
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<td>Kidney CA</td>
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<tr>
<td>Brain CA</td>
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<td>Leukemia</td>
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<td>Other lymph CA</td>
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<tr>
<td>Heart Failure [55-74]</td>
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<td>Heart Failure [75+]</td>
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<td>Ill-defined HD [75+]</td>
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<td>Stroke [75+]</td>
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<tr>
<td>Art/arterio/cap [75+]</td>
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<td>COPD [75+]</td>
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<td>Automobile [55+]</td>
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<td>Other accidental [55+]</td>
<td>0.96</td>
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## Men

<table>
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<th>Disease</th>
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<th>Estimated Hazard</th>
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<tbody>
<tr>
<td>Oral CA</td>
<td>1.14</td>
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</tr>
<tr>
<td>Colon CA</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Rectal CA</td>
<td>0.62</td>
<td></td>
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<tr>
<td>Pancreatic CA</td>
<td>1.34</td>
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</tr>
<tr>
<td>Bladder CA</td>
<td>1.24</td>
<td></td>
</tr>
<tr>
<td>Kidney CA</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>Leukemia</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>Other lymph CA</td>
<td>1.07</td>
<td></td>
</tr>
<tr>
<td>Hypertension [75+]</td>
<td>1.78</td>
<td></td>
</tr>
<tr>
<td>Ischemic HD [35-54]</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Heart Failure [55-74]</td>
<td>1.16</td>
<td></td>
</tr>
<tr>
<td>Heart Failure [75+]</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>Ill-defined HD [75+]</td>
<td>1.19</td>
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</tr>
<tr>
<td>Stroke [75+]</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>Art/arterio/cap [75+]</td>
<td>0.80</td>
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</tr>
</tbody>
</table>

## Mortality Related to Race, With and Without Adjustment for SEP, 1979-89

<table>
<thead>
<tr>
<th>Disease</th>
<th>Age strata</th>
<th>Women Unadjusted H.R.</th>
<th>Women Adjusted H.R.</th>
<th>Men Unadjusted H.R.</th>
<th>Men Adjusted H.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infections</td>
<td></td>
<td>2.50</td>
<td>2.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stomach CA</td>
<td></td>
<td>2.23</td>
<td>2.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td>2.11</td>
<td>1.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>[55-74]</td>
<td>4.86</td>
<td>4.17</td>
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</tr>
<tr>
<td>Hypertension</td>
<td>[75+]</td>
<td>1.71</td>
<td>1.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ischemic HD</td>
<td>[35-54]</td>
<td>2.36</td>
<td>1.63</td>
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</tr>
<tr>
<td>Ischemic HD</td>
<td>[75+]</td>
<td>0.72</td>
<td>0.71</td>
<td></td>
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</tr>
<tr>
<td>Pulmonary</td>
<td></td>
<td>2.49</td>
<td>2.19</td>
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</tr>
<tr>
<td>Cardiomyopathy</td>
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<td>2.59</td>
<td>2.26</td>
<td></td>
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</tr>
<tr>
<td>Ill-defined HD</td>
<td>[55-74]</td>
<td>1.76</td>
<td>1.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>[55-74]</td>
<td>1.71</td>
<td>1.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>[55-74]</td>
<td>0.40</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cirrhosis</td>
<td></td>
<td>2.64</td>
<td>2.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suicide</td>
<td></td>
<td>0.34</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homicide</td>
<td>[25-54]</td>
<td>4.60</td>
<td>3.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other accidental</td>
<td>[25-54]</td>
<td>1.98</td>
<td>1.32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hazard Ratio for Black versus White Race for Death Related to Race, 1979-89

Howard et al., Annals of Epidemiology, 2000; 10: 214-223
Hazard Ratio for Black versus White Race for Death Related to Race, 1979-89

Howard et al., Annals of Epidemiology, 2000; 10: 214-223
Change in the Disparity in Life Expectancy if Selected Diseases were Eliminated

Heterogeneity of Socioeconomic Disparities in Health
### Causes of death and median income of Zip Code area of residence in the men screened for MRFIT: relative risk for $10,000 lower income

<table>
<thead>
<tr>
<th>RR &gt; 1.50</th>
<th>RR 1.21-1.50</th>
<th>RR 1.00-1.20</th>
<th>RR &lt; 1.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>Infection</td>
<td>Aortic aneurysm</td>
<td>Blood disease</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Coronary Heart Disease</td>
<td>Suicide</td>
<td>Motor neurone disease</td>
</tr>
<tr>
<td>Rheumatic Heart Disease</td>
<td>Stroke</td>
<td>Nervous system disease</td>
<td>Flying accidents</td>
</tr>
<tr>
<td>Heart failure</td>
<td>Cirrhosis</td>
<td>Oesophageal cancer</td>
<td>Lymphoma</td>
</tr>
<tr>
<td>COPD</td>
<td>Genitourinary disease</td>
<td>Stomach cancer</td>
<td>Hodgkin’s disease</td>
</tr>
<tr>
<td>Pneumonia/Influenza</td>
<td>SR Symptoms</td>
<td>Pancreatic cancer</td>
<td>Melanoma</td>
</tr>
<tr>
<td>Homicide</td>
<td>Accidents</td>
<td>Prostate cancer</td>
<td>Bone/connective tissue cancer</td>
</tr>
<tr>
<td></td>
<td>Lung cancer</td>
<td>Bladder cancer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Liver cancer</td>
<td>Kidney cancer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Colorectal cancer</td>
<td>Brain cancer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Myeloma</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leukaemia</td>
<td></td>
</tr>
</tbody>
</table>

Davey Smith (1996)

Ages 15-19

Traffic Injuries

Falls

OR

High Employees

Skilled Workers

Unskilled Workers

<table>
<thead>
<tr>
<th>More Common Among Poor</th>
<th>Incidence</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouth/Pharynx</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Oesophagus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stomach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Larynx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cervix</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>More Common Among Rich</th>
<th>Incidence</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melanoma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>Colon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ovarian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testis</td>
<td>?</td>
<td></td>
</tr>
</tbody>
</table>

No Evidence for Socioeconomic Patterns

Rectum, Pancreatic, Bone, Connective Tissue, Prostate, Bladder, Kidney, Brain, Thyroid, Lymphomas, Leukemia

IARC (1997)
Age-specific Melanoma Risk and Census Tract Income
Washington State, 1974-85

International Heterogeneity in the Magnitude and Direction of Social Inequalities in Health
Manual vs Non-Manual Health Inequalities, Europe

RR: Mortality (Man vs Non-Man)

Probability of Dying

Men 45-59

France
Finland
England/Wales
Sweden
Ireland
Spain
Portugal
Italy
Switzerland
Norway
Denmark

Rate Ratio: Manual vs Non-manual

Cancer Mortality

Men 45-59

France, Finland, England/Wales, Sweden, Ireland, Spain, Portugal, Italy, Switzerland, Norway, Denmark

Implies differing socioeconomic distributions of the risk factors for IHD across countries.

So what have we learned?

This is your quiz

Can You Explain this Health Disparity?
What process generated this health disparity?

Some Clues

- Very famous and occurred in 1st decades of 20th C
- This entire population was susceptible
- Despite this, lower class women had 20 times higher death rate - 45% of lower class women died
- And men died at even higher rates than women
How should we understand this health disparity?

- Drowning gene?
- More stressed?
- Low self-efficacy?
- Lack of exercise?
- Targeted intervention?

swimming lessons
Nature of the Social Structure

- Distribution of specific health protective resources
- Various socioeconomic positions within that structure

Lifeboats

Social disparity in the death rates
Can apply the same idea to understanding this pattern

**Breast Cancer Incidence**

- **White Women**
- **Black Women**

**Breast Cancer Mortality**

- **Black Women**
- **White Women**

How does the social structure distribute risk factors for breast cancer incidence?

How does the social structure distribute risk factors for breast cancer mortality?

National Center for Health Statistics, USA (1998)
We need to include heterogeneity in our explanations for social disparities in health.

The direction and extent of social disparities in health differs:
- by outcome
- by exposure – education, income
- by place
- over time

This may help make the problem of health disparities seem less intractable and suggests that social disparities in health are rooted in the nature of the social structures created by humans and thus amenable to change.
Conclusion
• The example of the Russian mortality crisis and the rise in Japanese LE show how social factors can strongly affect levels and trends in population health BUT they do so specifically through their links to risk factors for specific outcomes.

• Applied to health disparities, this suggests we can use the underlying heterogeneity of associations to suggest more specific links between socioeconomic markers and race/ethnicity and risk factors and specific health outcomes.

• This may weaken the case for general psychosocial processes in determining population health or health disparities

Lynch and Davey Smith (2003)
Where do psychosocial factors fit?

- The case for the importance of psychosocial factors to health does not need to be made on the grounds that they are key determinants in the etiology of diseases like CVD and cancer, although they may be etiologically important to some outcomes such as homicide.

- They are also important outcomes in their own right because of their contributions to quality of life in affluent societies.

- The quantity of life may well be a relatively unimportant contributor to the quality of life in affluent societies and this means psychosocial phenomena are important as population health outcomes.

Thank you