

Public Health & Health Disparities/Health Justice

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What is Public Health?

“Public health refers to all organized measures (whether public or private) to prevent disease, promote health, and prolong life among the **population as a whole**. Its activities aim to provide conditions in which people can be healthy and focus on entire populations, not on individual patients or diseases. Thus, public health is concerned with the total system and not only the eradication of a particular disease.” - *The World Health Organization*

Core Functions of Public Health Steering Committee: "Public Health in America"

❑ **Core Functions of Public Health**

- Assessment
- Policy development
- Assurance

❑ **Purpose of Public Health**

- Prevent epidemics and spread of disease
- Protect against environmental hazards
- Prevent injuries
- Promote and encourage healthy behaviors
- Respond to disasters and assist communities in recovery
- Assure the quality and accessibility of services

<http://iom.edu/Reports/1988/The-Future-of-Public-Health.aspx>

<http://www.health.gov/phfunctions/public.htm>


Some Public Health Headlines

SPORTS FINAL

NEW YORK'S HOMETOWN NEWSPAPER

First confirmed city case of deadly virus

NY DOC HAS EBOLA



Harlem MD stricken after return from Guinea

He rode trains, took car service, now in hosp

Bowled at two B'klyn lanes Wednesday

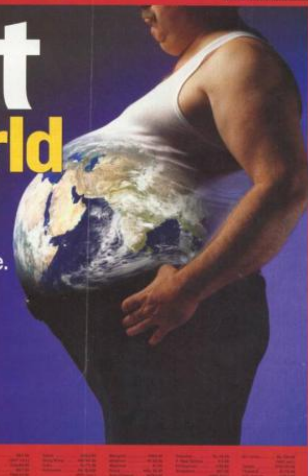
Cuomo, Blaz and health czar urge calm

PAGES 2,3,4,5,6,7

THE AUSTRALIANS ARE COMING • BEIJING BACKLASH

Newsweek

Fat World



We're Eating More Junk And Getting Less Exercise.

Obesity Is The Globe's Newest Epidemic.

CUPCAKE TREAT AT MIDDAY MEAL LANDS 341 STUDENTS IN HOSPITAL

Within minutes of consuming the pastries, the students started vomiting and complaining of nausea and dizziness, and were rushed to several suburban hospitals; principal insists only 60-70 actually had food poisoning




STOP THE DISTRIBUTION OF MIDDAY MEALS: PARENTS

MD DART spoke to school students and their angry parents, after the incident was reported to the school board. The principal of the school was told that the incident was a result of a cupcake treat distributed at the school. The school board is now investigating the incident and has asked the principal to stop the distribution of midday meals. Parents are also demanding that the school board take action to prevent such incidents from happening again.

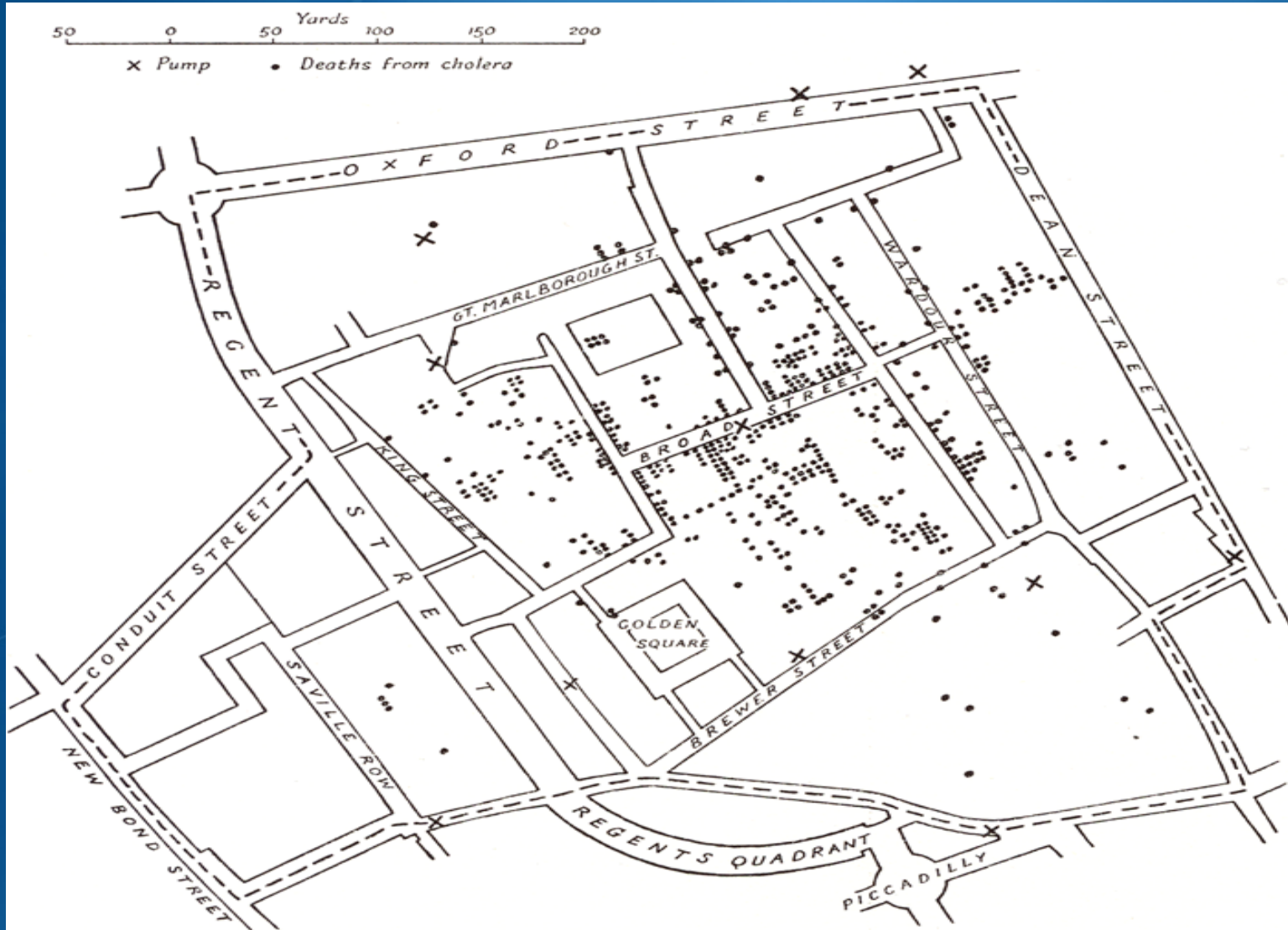


Origins of Public Health

Cholera (1827-1835; 1839-1856)



John Snow & the Broad St Pump, London 1854



American Water Systems

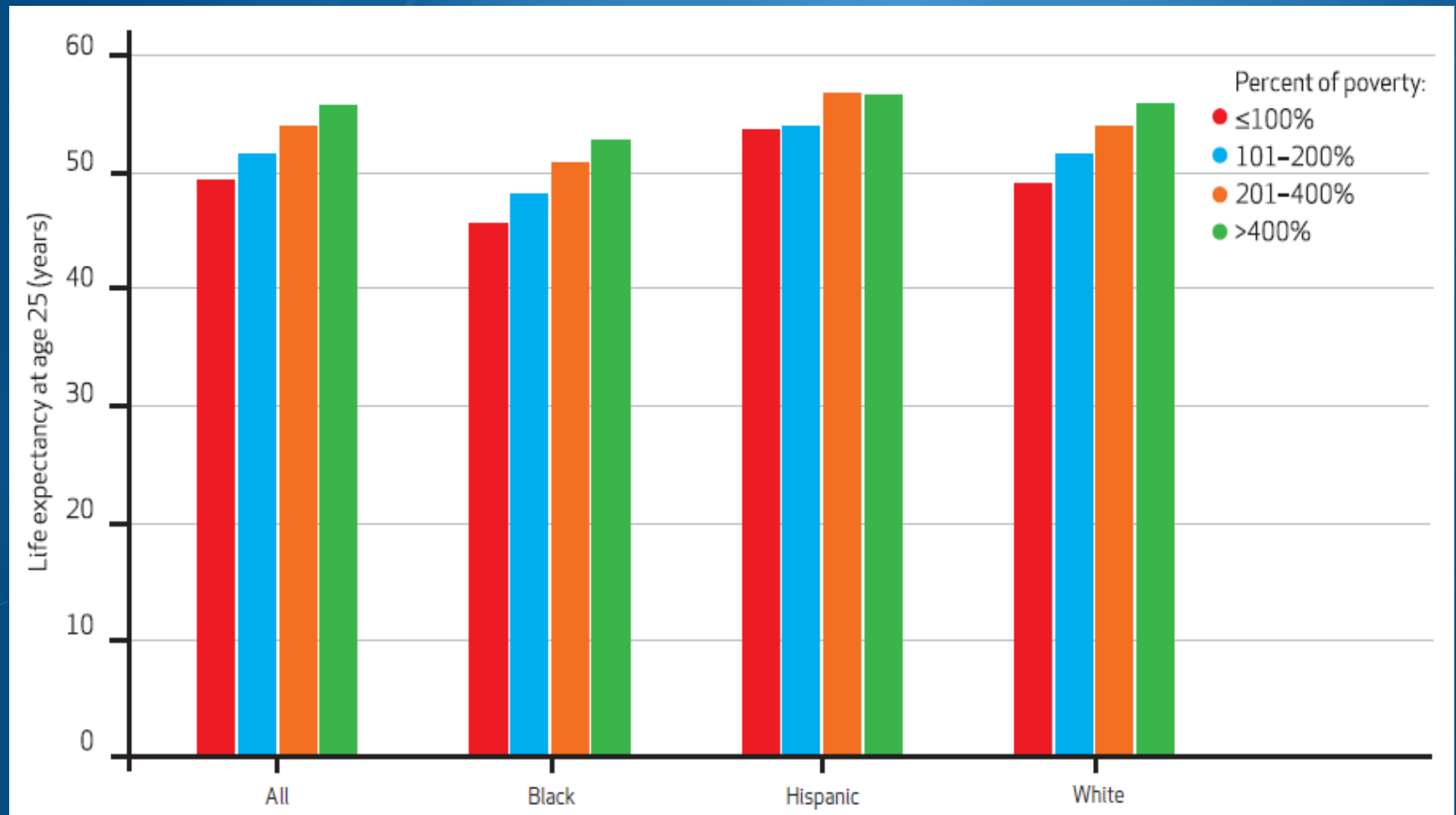
Fairmount Water Works,
Philadelphia , 1812



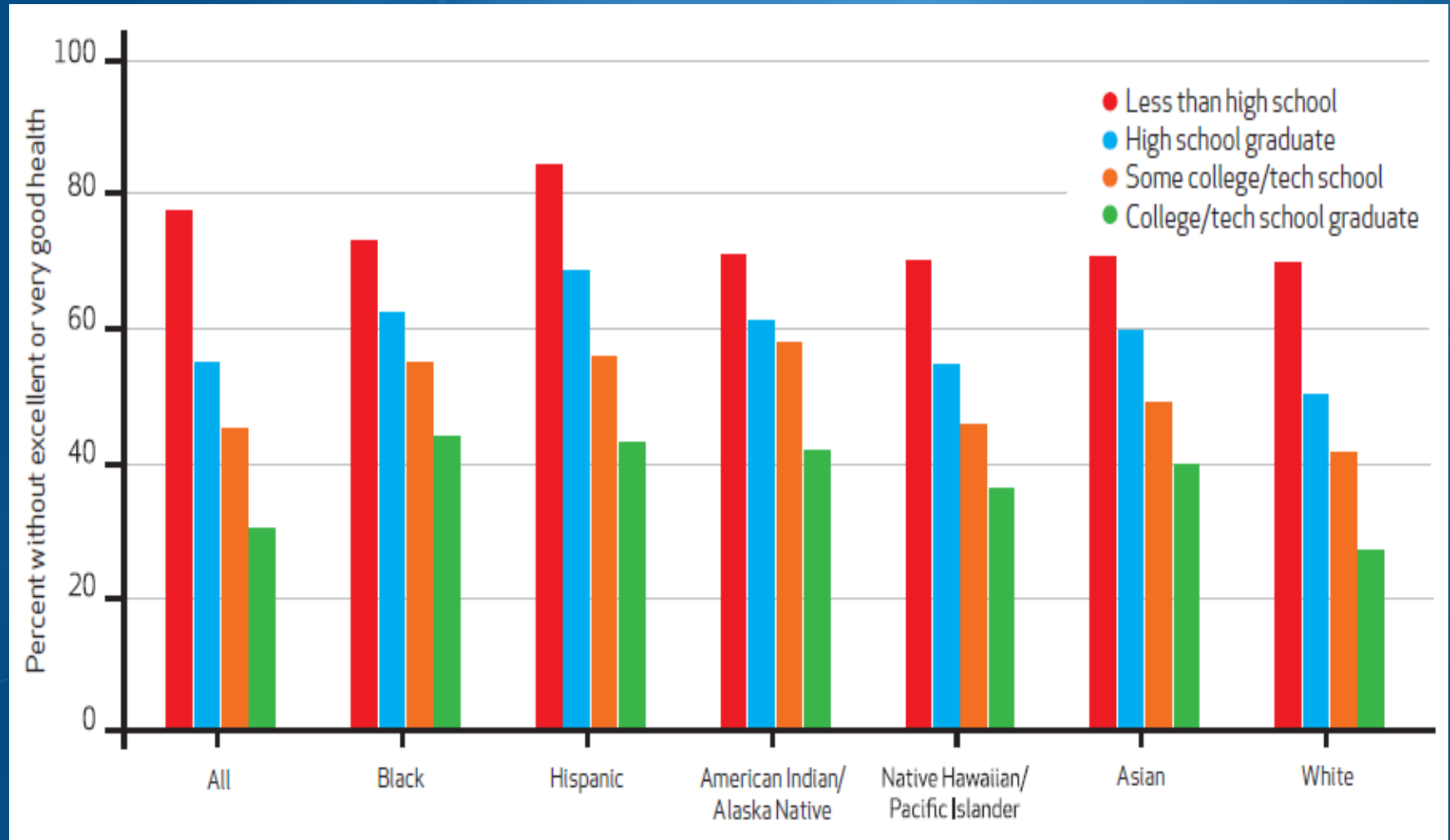
Croton Water System,
New York City, 1842

Public Health & Health Disparities

Disparities In US Life Expectancy At Age 25, By Income And Race Or Ethnicity



Disparities In Health Status Of US Adults Ages 25–74, By Educational Attainment And Race Or Ethnicity

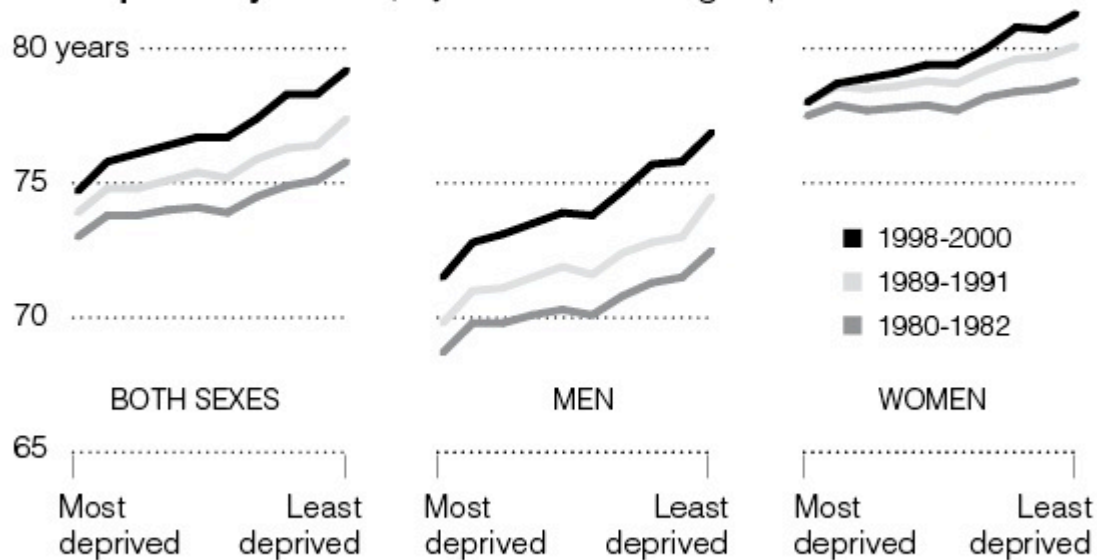


Growing Disparities in Life Expectancy

Growing Disparities

New research has found that differences in life expectancy for richer and poorer Americans have grown in the last two decades.

Life expectancy at birth, by socioeconomic groups



Source: Gopal K. Singh and Mohammad Siahpush, using data from Department of Health and Human Services

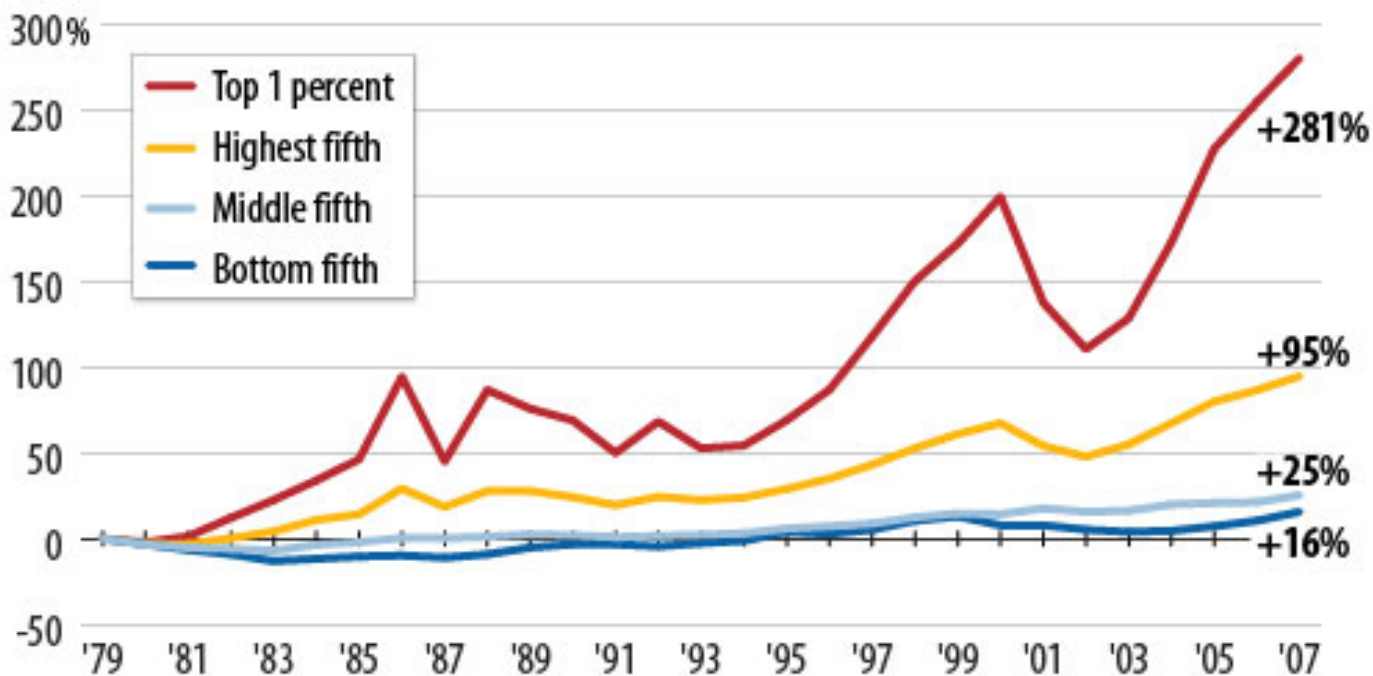
THE NEW YORK TIMES

Income Growth in U.S.

Figure 1:

Income Gains at the Top Dwarf Those of Low- and Middle-Income Households

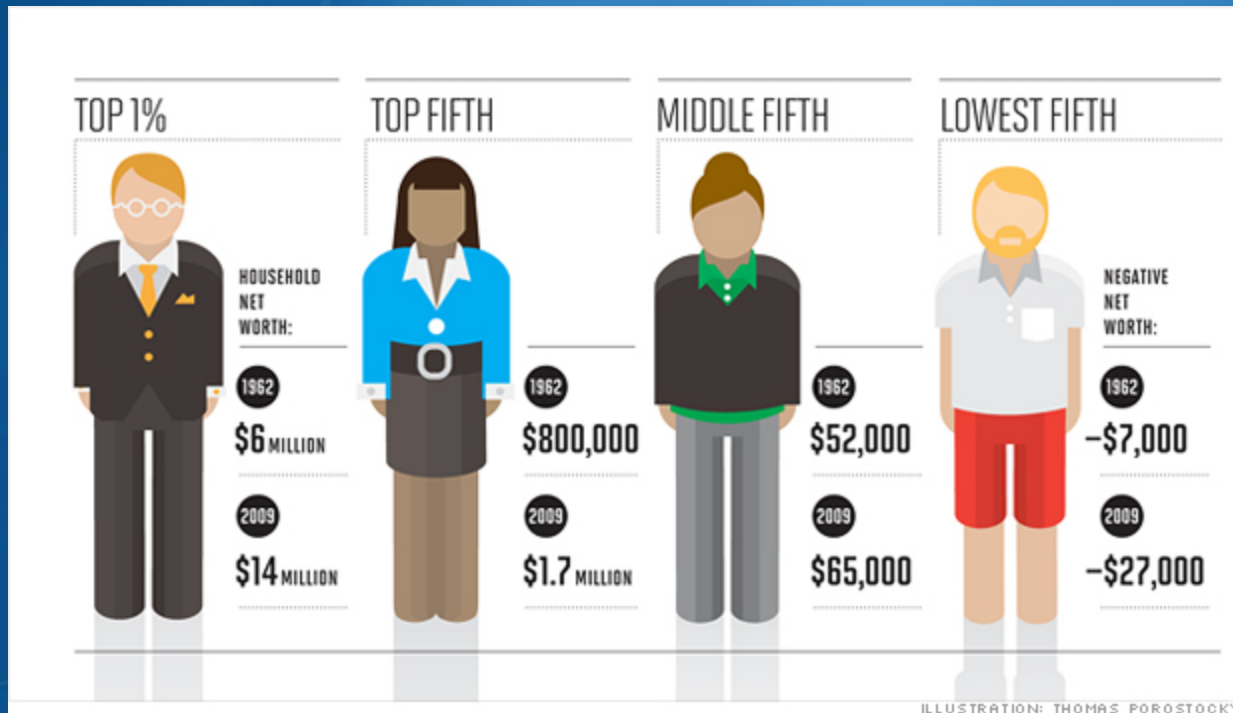
Percent Change in After-Tax Income Since 1979



Source: CBPP calculations from Congressional Budget Office data.

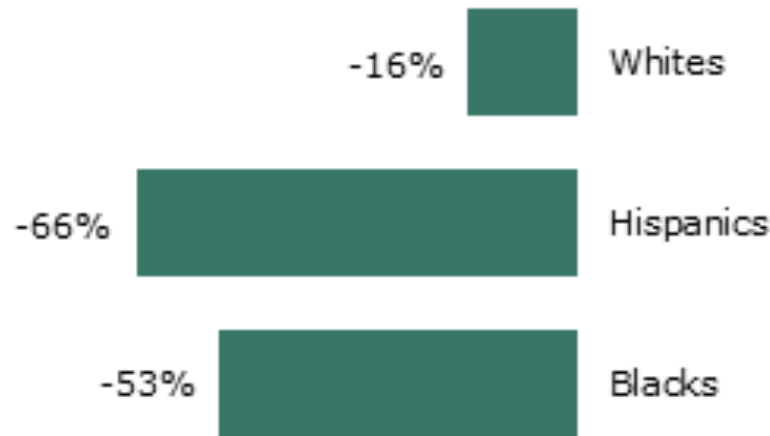
cbpp.org

Income Disparities



Change in Median Net Worth

Percentage Change in Median Net Worth of Households, 2005 to 2009



Source: Pew Research Center tabulations of Survey of Income and Program Participation data

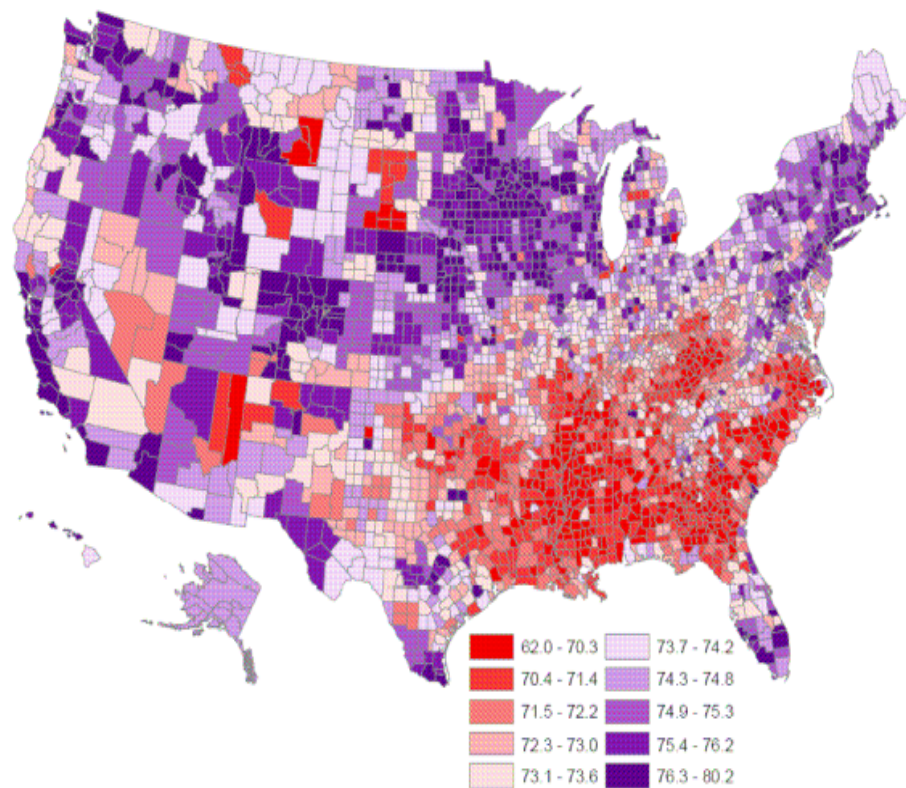
PEW RESEARCH CENTER

Eight America: Investigating Mortality Disparities across Races, Counties, and Race-Counties in the United States

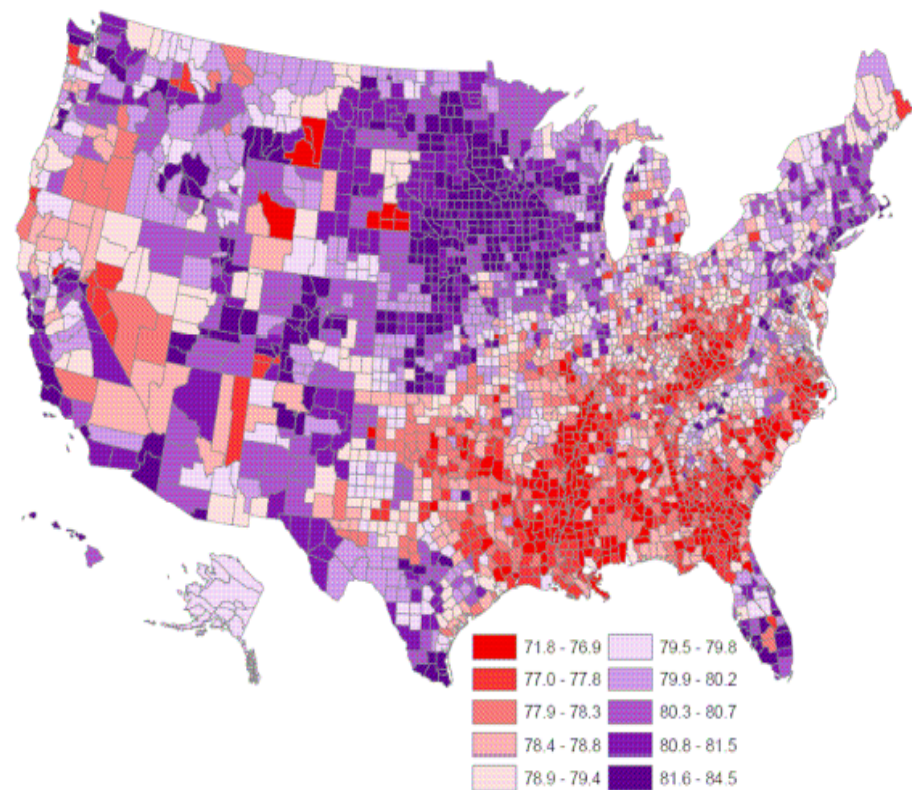
Murray CJ, Kulkarni S, Ezzati M. Eight Americas: new perspectives on U.S. health disparities. *Am J Prev Med.* 29 (5 Suppl 1):4-10, 2005.

County life expectancy 1997-2001

Males

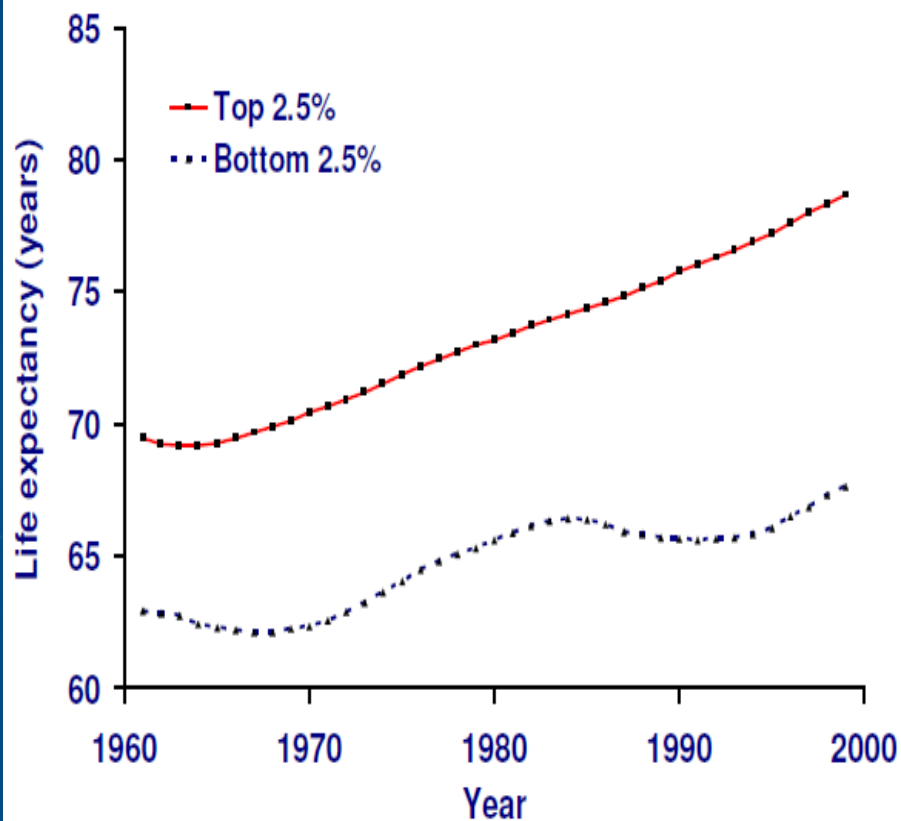


Females

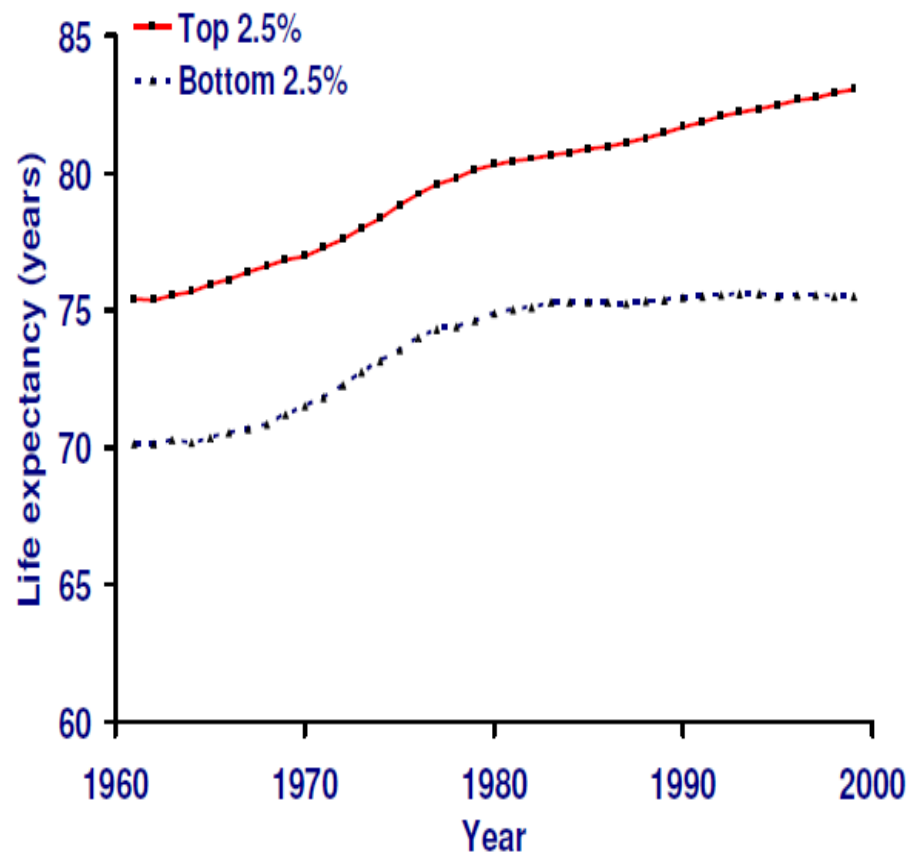


Life Expectancy for Top and Bottom 2.5% of Counties

Male



Female

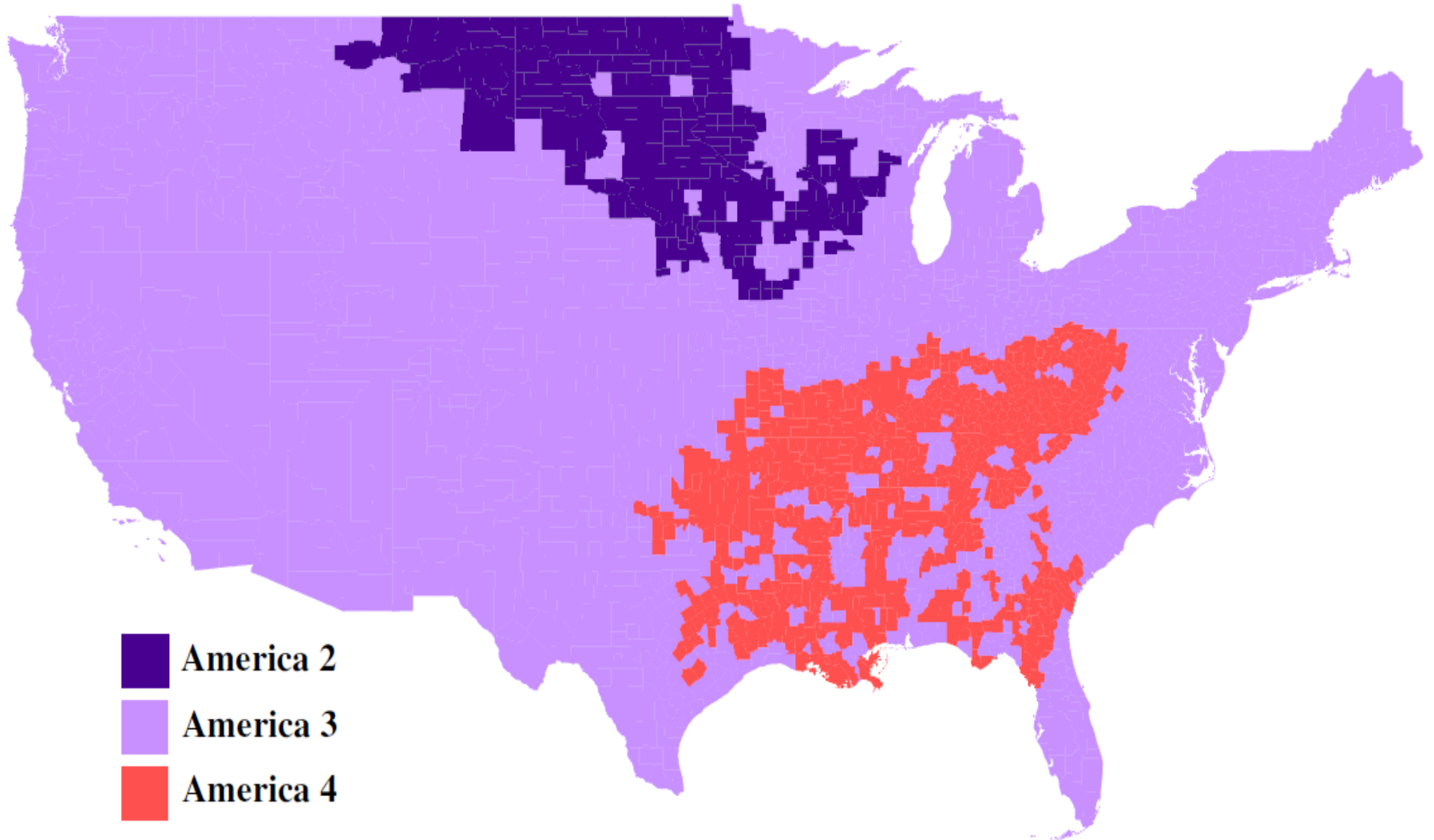


The Eight Americas

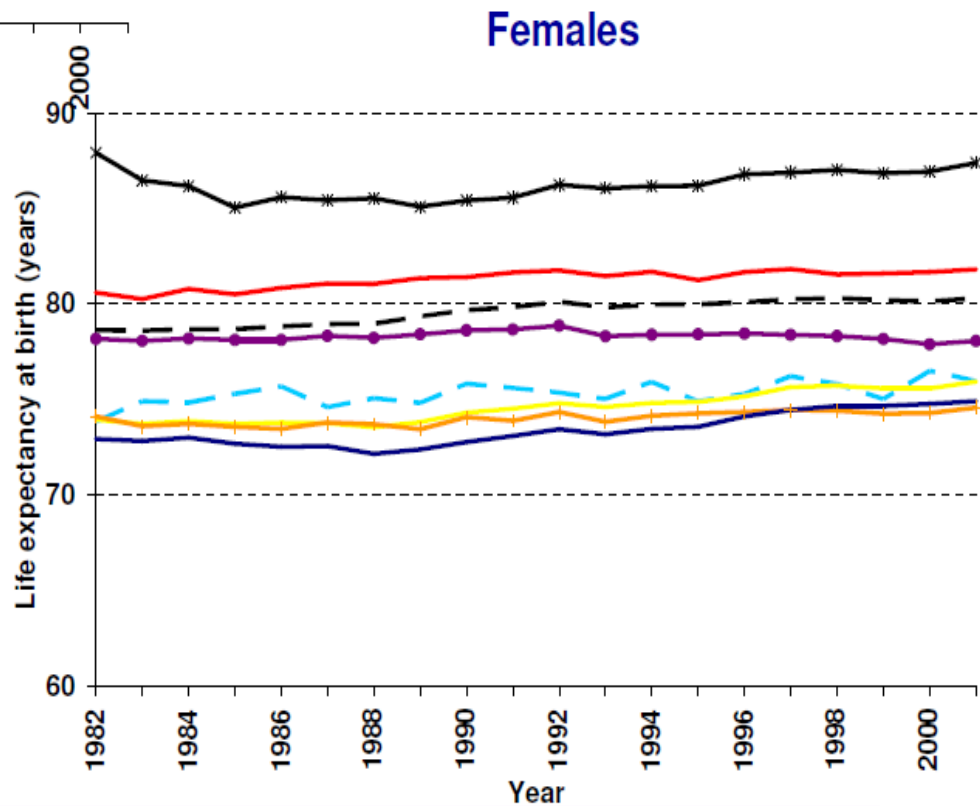
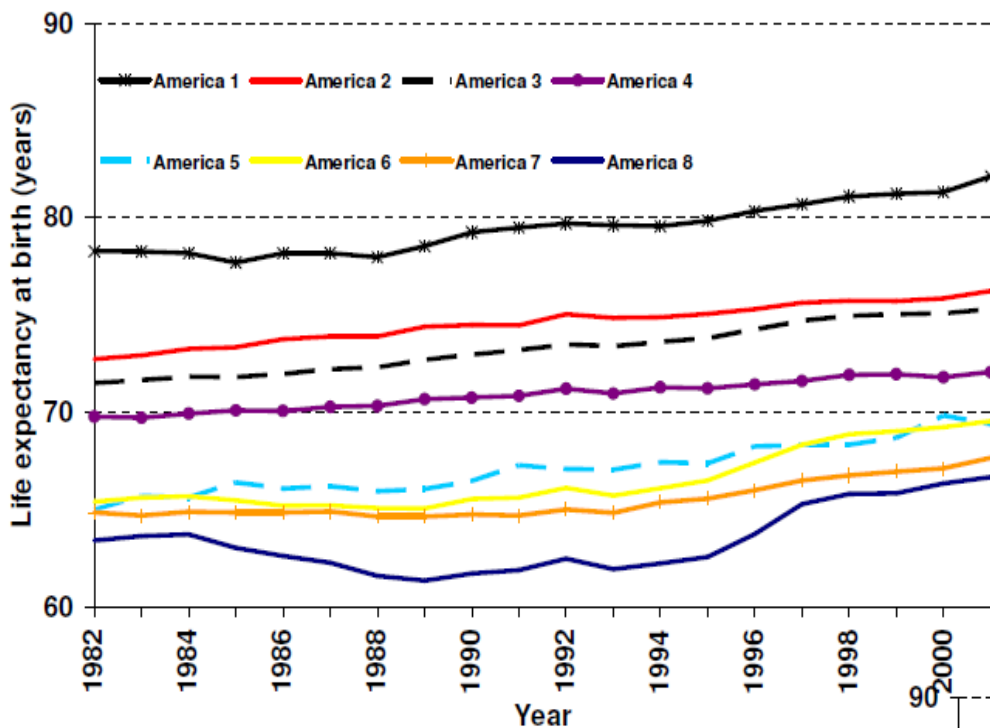
America	General Description	Population (Millions)	Average Income Per Capita	Percent Completing High School	Definition
1	Asian	10.4	\$21,566	80%	Asians living in counties where Pacific Islanders make up less than 40% of total Asian population
2	Northland low-income rural white	3.6	\$17,758	83%	Whites in northern plains and Dakotas with 1990 county-level per capita income below \$11,775 and population density less than 100 persons/km ²
3	Middle America	214.0	\$24,640	84%	All other whites not included in Americas 2 and 4, Asians not in America 1, and Native Americans not in America 5
4	Low-income whites in Appalachia and the Mississippi Valley	16.6	\$16,390	72%	Whites in Appalachia and the Mississippi Valley with 1990 county-level per capita income below \$11,775
5	Western Native American	1.0	\$10,029	69%	Native American populations in the mountain and plains areas, predominantly on reservations
6	Black Middle America	23.4	\$15,412	75%	All other black populations living in counties not included in Americas 7 and 8
7	Southern low-income rural black	5.8	\$10,463	61%	Blacks living in counties in the Mississippi Valley and the Deep South with population density below 100 persons/km ² , 1990 county-level per capita income below \$7,500, and total population size above 1,000 persons (to avoid small numbers)
8	High-risk urban black	7.5	\$14,800	72%	Urban populations of more than 150,000 blacks living in counties with cumulative probability of homicide death between 15 and 74 y greater than 1.0%

Population, income per capita, and education were calculated for race-county combinations from the 2000 US census.
DOI: 10.1371/journal.pmed.0030260.t001

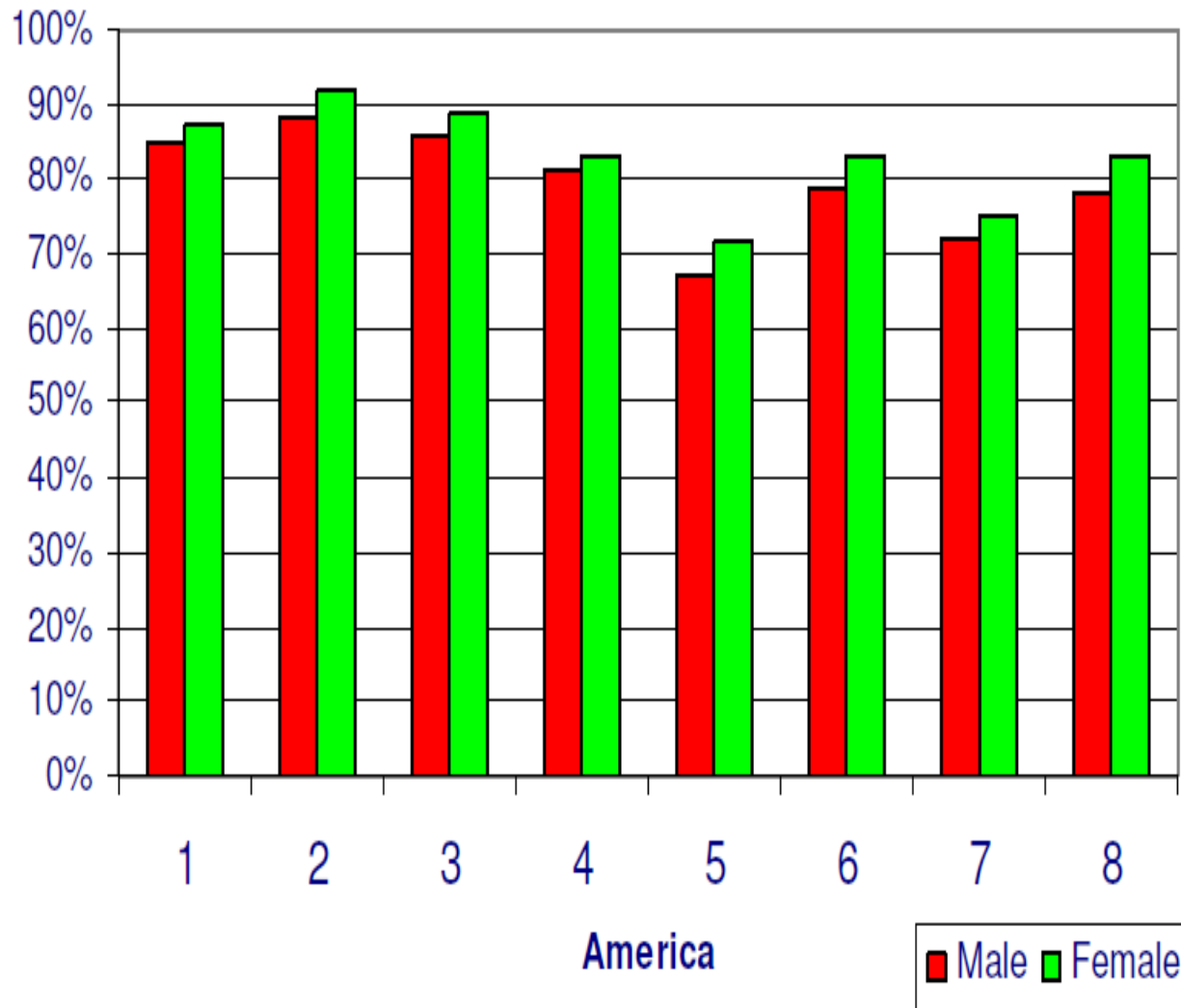
Americas 2, 3, and 4



Life Expectancy at Birth in the Eight Americas



Health Plan Coverage



Difficult to Explain
Disparities
Between 8
Americas on the
Basis of Reported
Healthcare Access

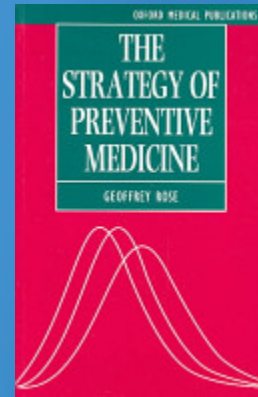
Sick Individuals & Sick Populations

Sir Geoffrey Rose

1926-1993



- 1985: seminal article "*Sick Individuals and Sick Populations*"
- 1992: Book *The Strategy of Preventive Medicine*



Sick Individuals and Sick Populations

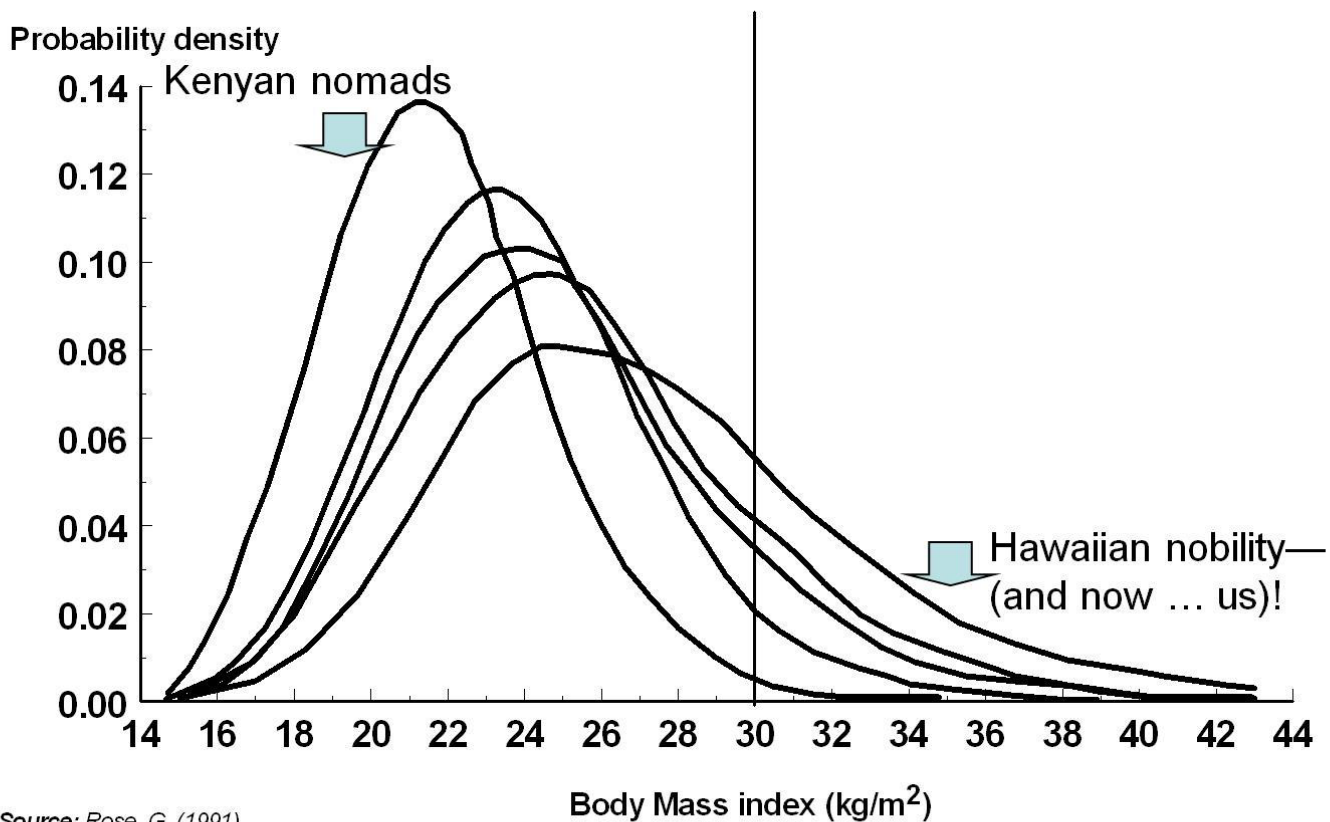
Some Epidemiological Concepts:

- Incidence
- Prevalence
- Relative risk
- Exposure

Causes of Individual Cases vs. Causes of Incidence

Distributions of BMI

The shifting distributions of BMI of five population groups of men and women aged 20-59 years derived from 52 surveys in 32 countries.



Source: Rose, G. (1991).

Adapted from Shiriki Kumanyika slide show

Genes and Environment

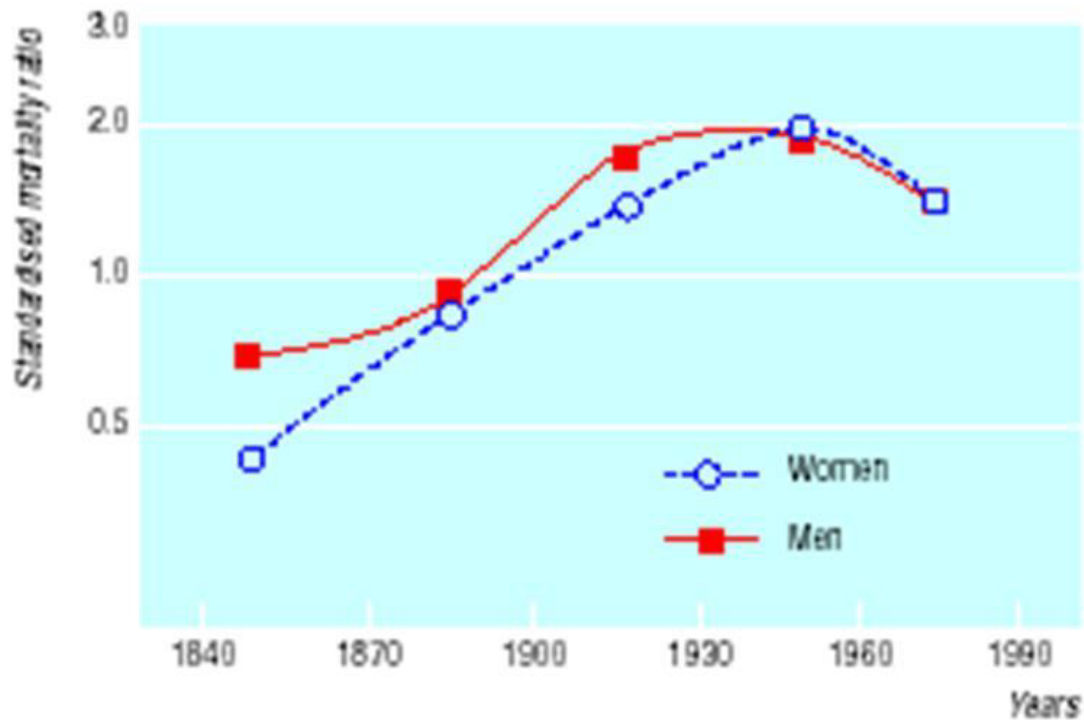


Fig 2 Mortality from familial hypercholesterolemia according to sex and time. Mortality was estimated among 250 persons with 0.5 probability of carrying the V408M. Probands and the first 20 years of life were ignored

Source: Sijbrands E, et al. BMJ 2001

Predicting Heart Disease (1950s)

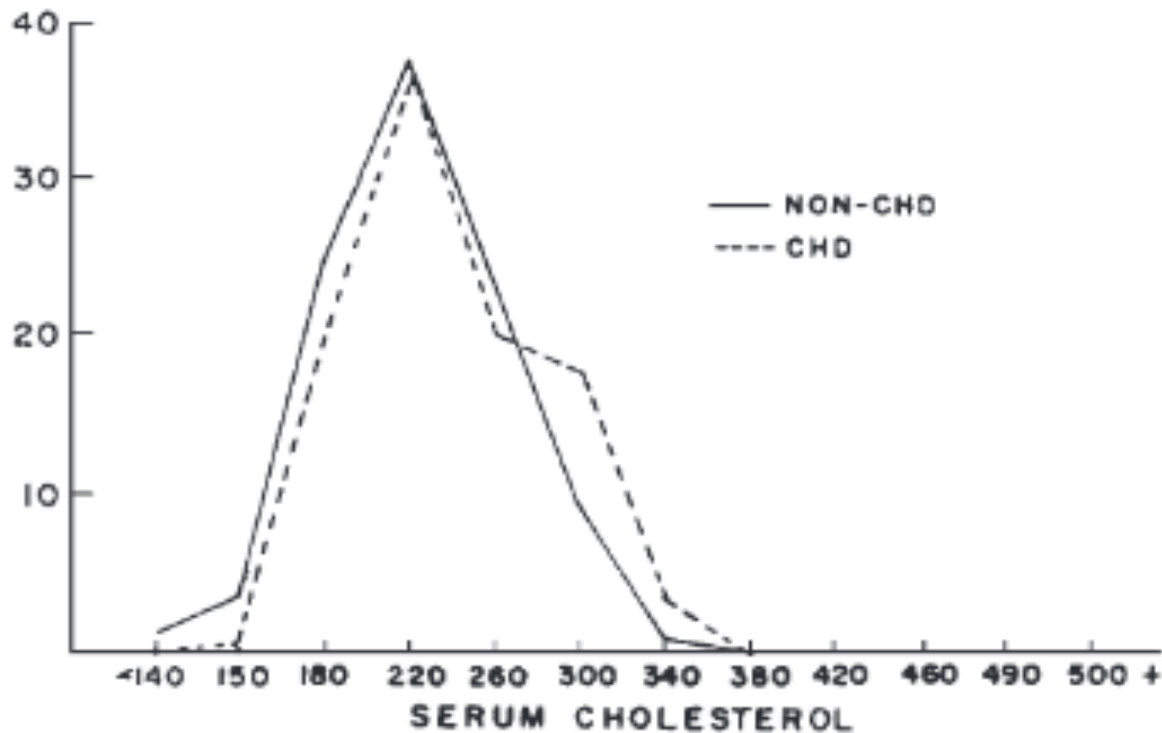
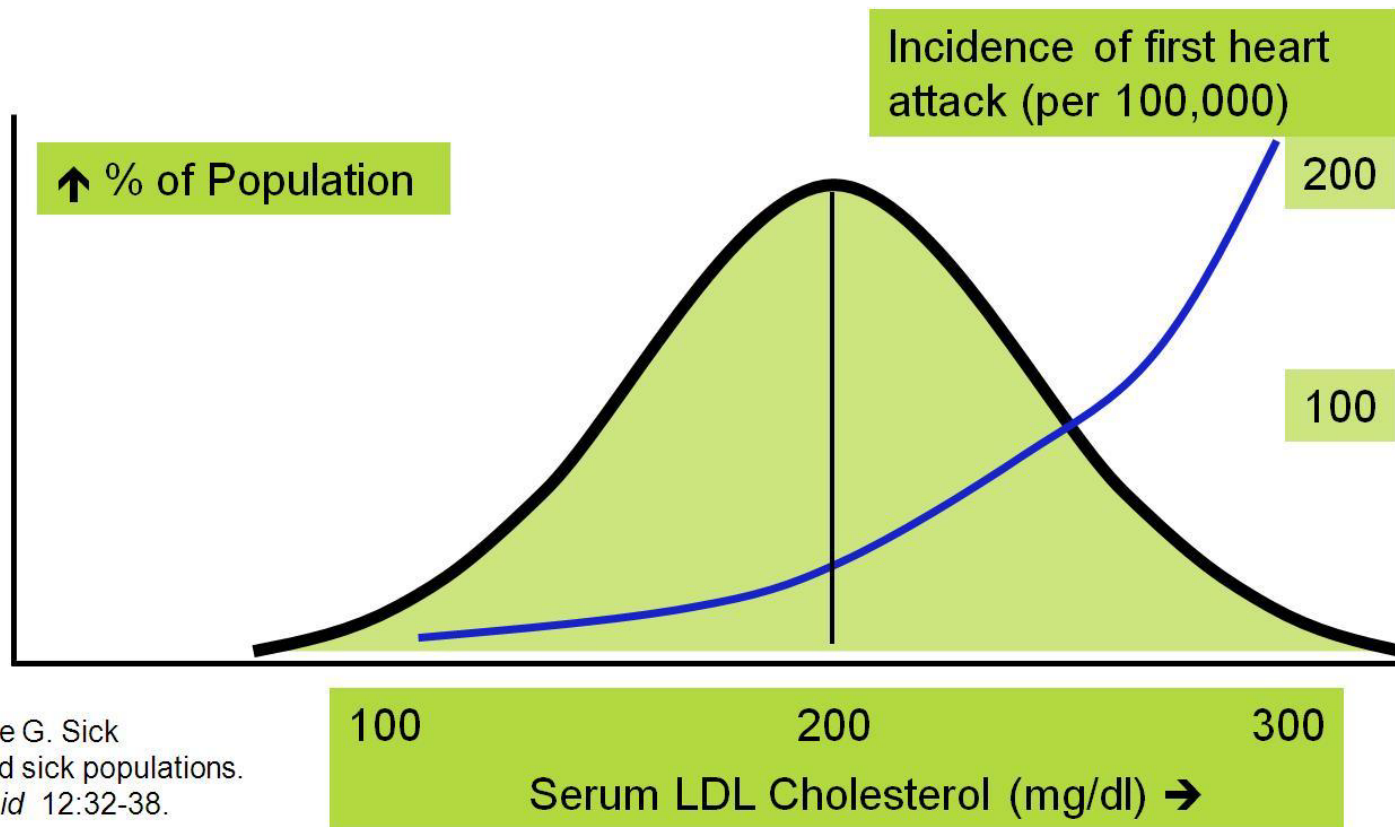


Figure 3 Percentage distribution of serum cholesterol levels (mg/dl) in men aged 50–62 who did or did not subsequently develop coronary heart disease (Framingham Study⁵)

Causes of Incidence: Two factors

1. The Exposure-Risk relationship
2. Distribution of the Risk Factor in the population

LDL Cholesterol & Heart Attack



Source: Rose G. Sick
Individuals and sick populations.
1985; *Int J Epid* 12:32-38.

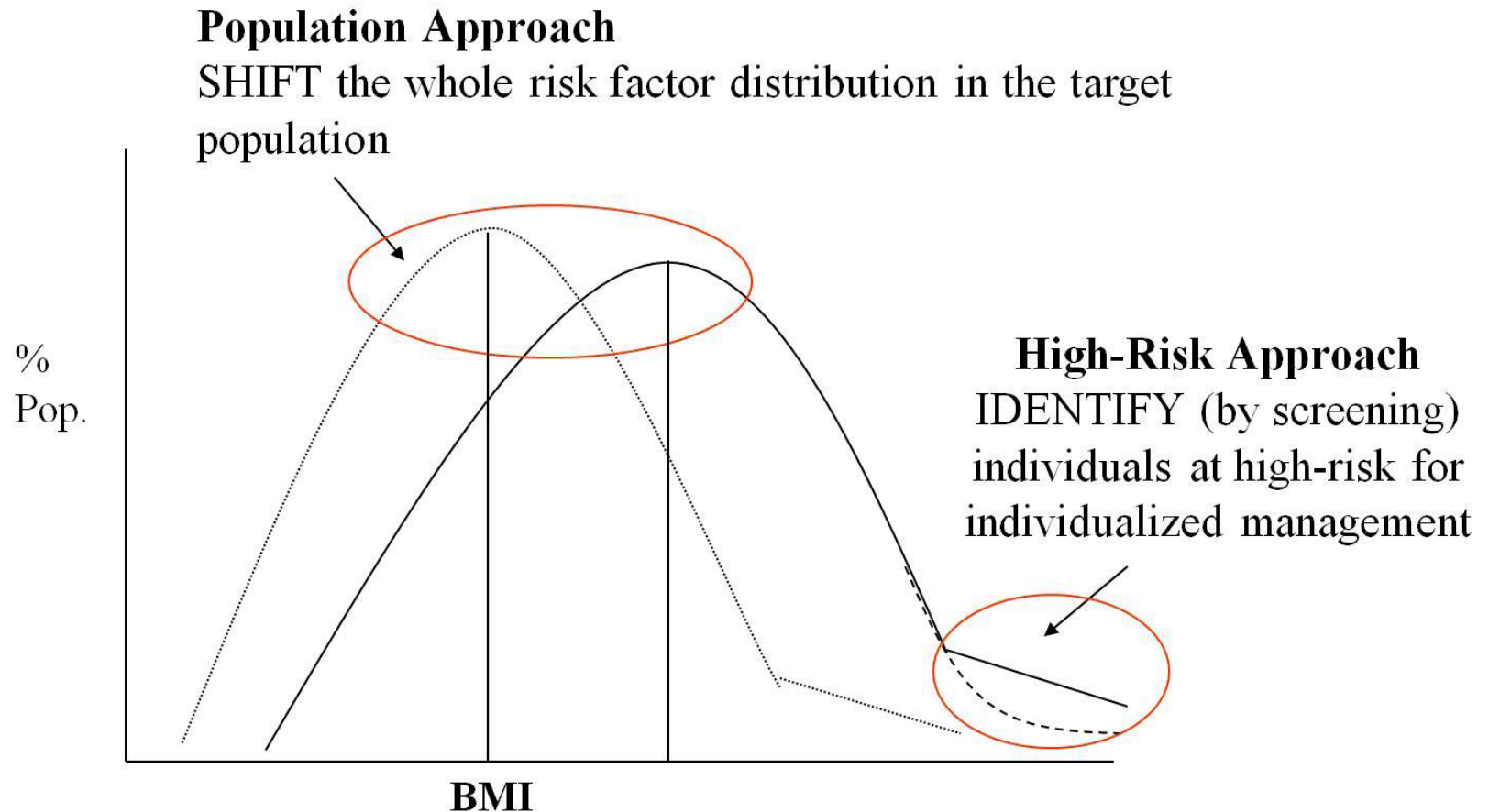
Incidence of Down's Syndrome



Table 4 Incidence of Down's syndrome according to maternal age⁷

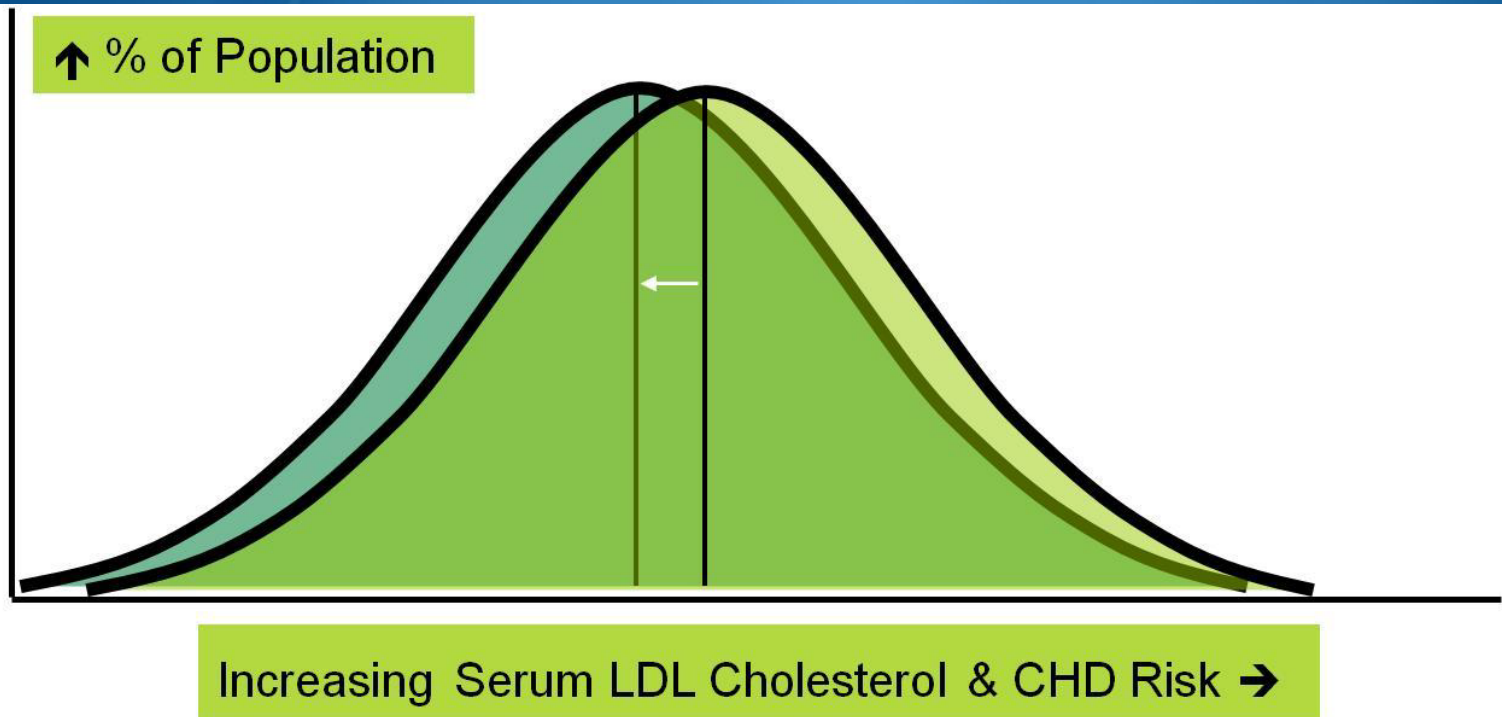
Maternal age (years)	Risk of Down's syndrome per 1000 births	Total births in age group (as % of all ages)	% of total Down's syndrome occurring in age group
<30	0.7	78	51
30-34	1.3	16	20
35-39	3.7	5	16
40-44	13.1	0.95	11
≥45	34.6	0.05	2
All ages	1.5	100	100

Population vs High Risk Strategies



Source: Rose G. The Strategy of Preventive Medicine
Oxford Press, 1992

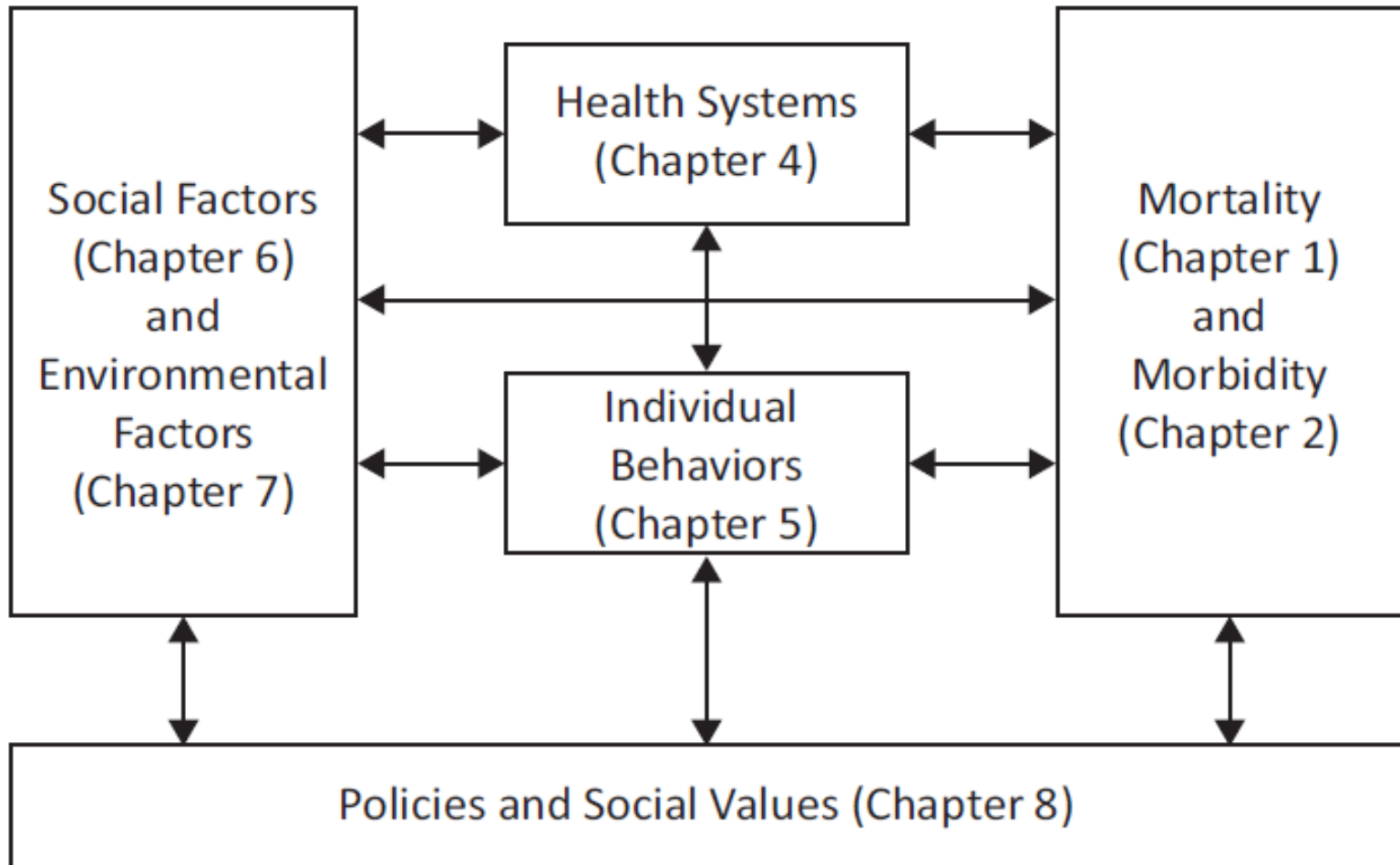
Rose: “seek the causes of incidence, not just the causes of cases.”



Source: Rose G. Sick Individuals and sick populations. 1985; *Int J Epid* 12:32-38.

Understanding Social Causation

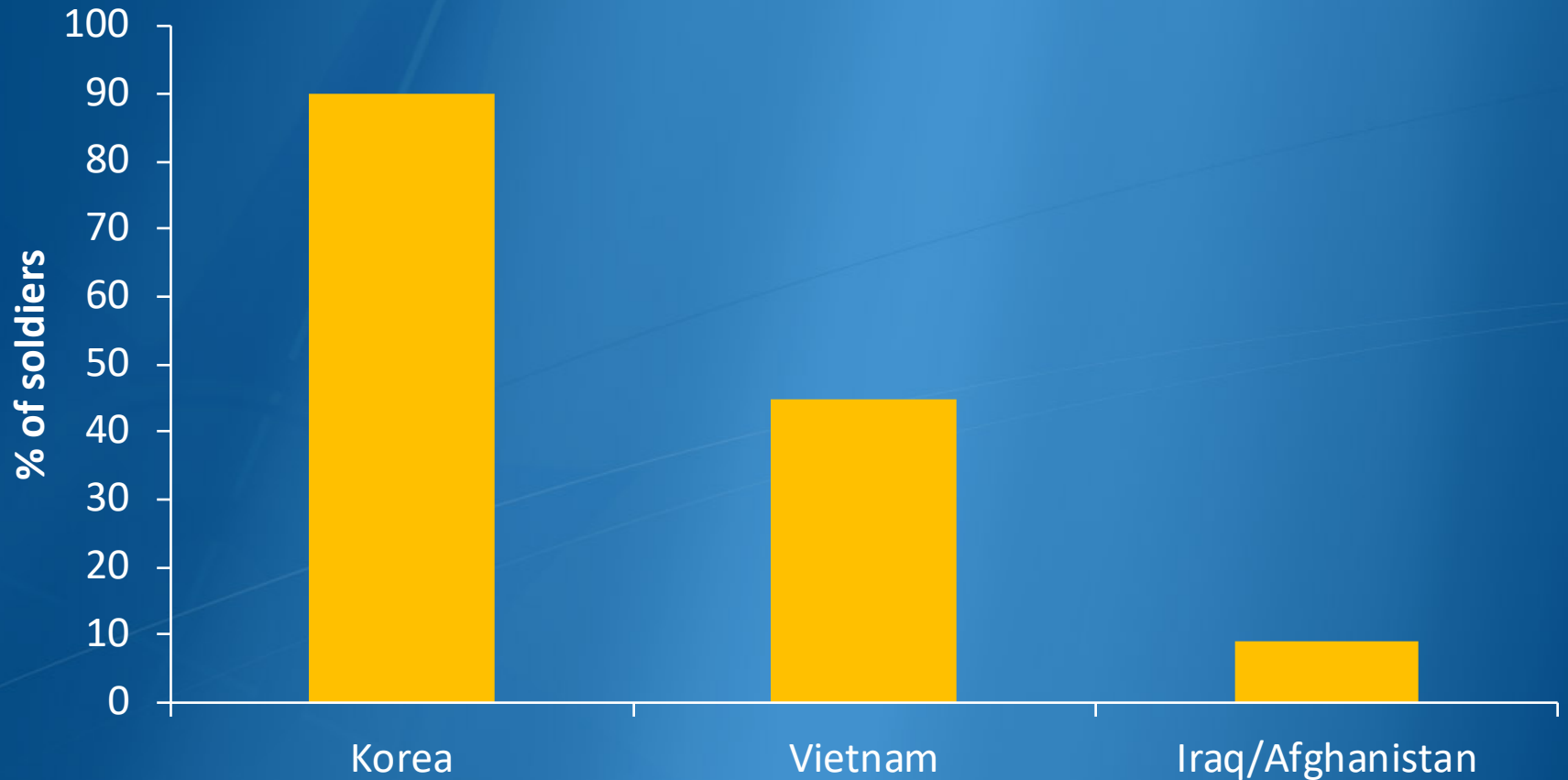
Model to achieve Healthy People 2020 overarching goals



Important Concepts

- Chain of Causation
 - Upstream (distal) vs Downstream (proximal)
- Multicausality
- Life-Course Perspective
 - Conceptual issues
 - Period Effect: time
 - Cohort Effect: group
 - Age Effect: aging
- Epigenetics
- Some important factors
 - Allostatic Load
 - Chronic stress
 - Race
 - Social construction vs biological

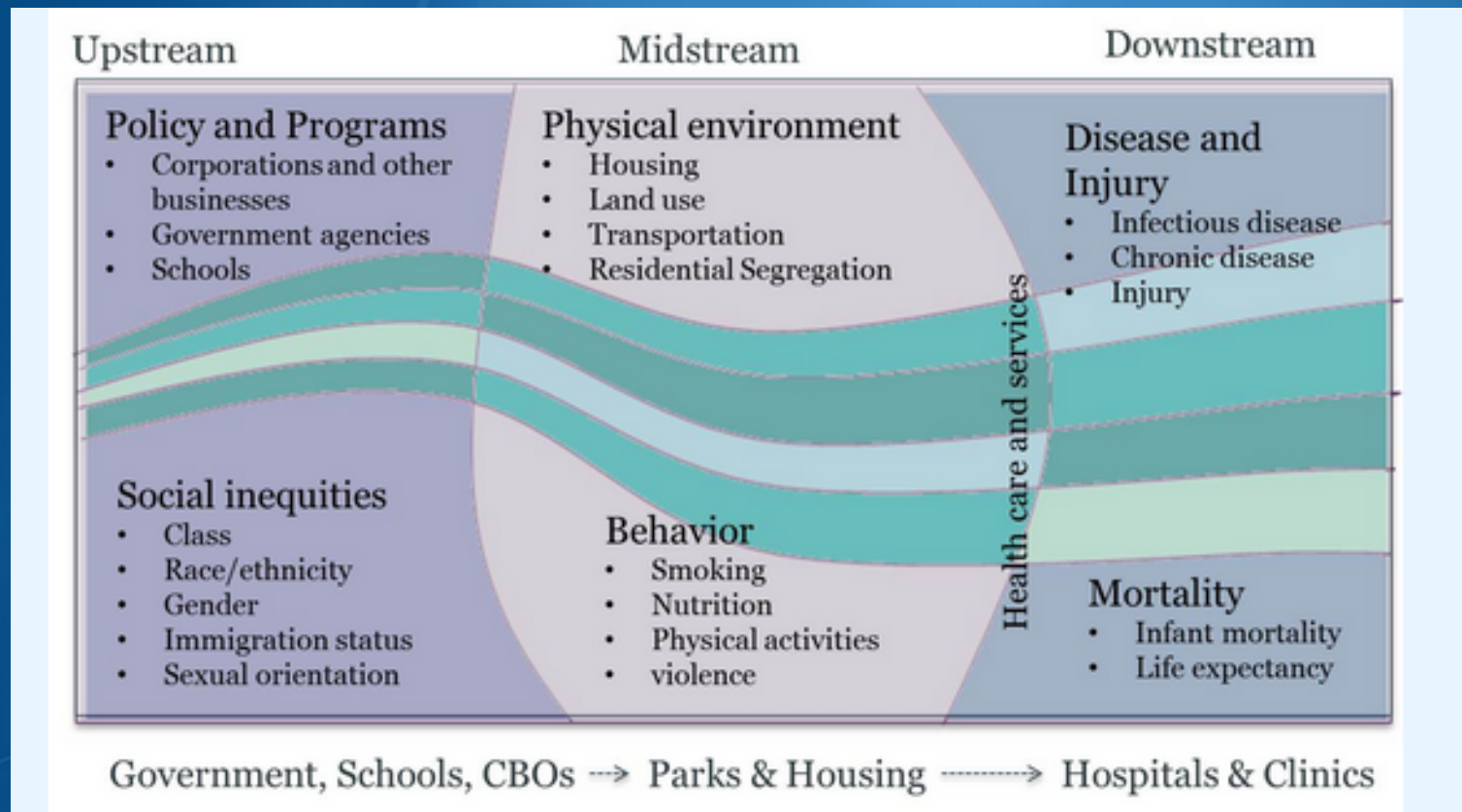
Prevalence of Atherosclerosis Autopsies of U.S. GIs



Source: New York Times

Upstream and Downstream

Upstream-Midstream-Downstream

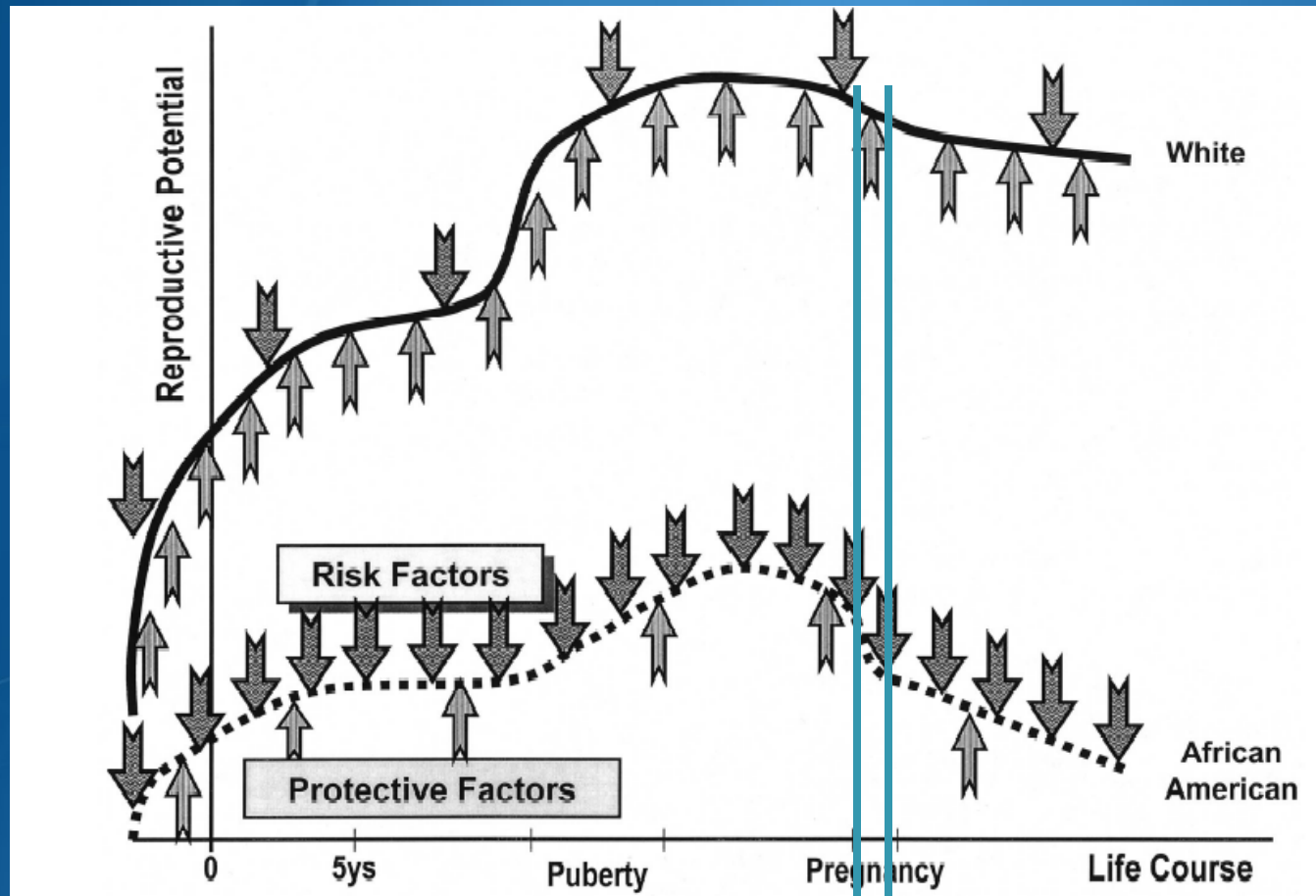


Life Course Perspective

Some Important Concepts

- Many diseases are developed over long periods of time
- Fetal programming
- Critical or sensitive periods
- Cumulative Impact (“weathering”)

Life Course Perspective



Lu MC, Halfon N. Racial and ethnic disparities in birth outcomes: a life-course perspective. *Matern Child Health J.* 2003;7:13-30.

Developmental Programming

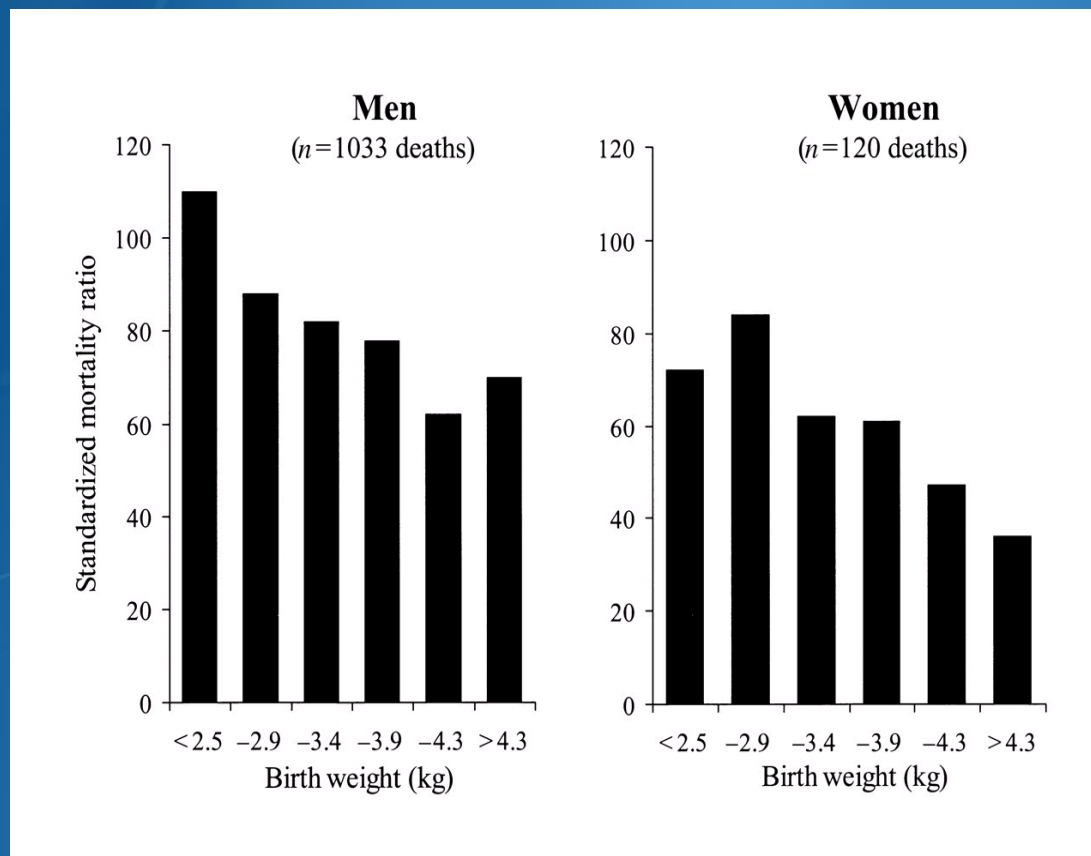


David Barker & Fetal Origins

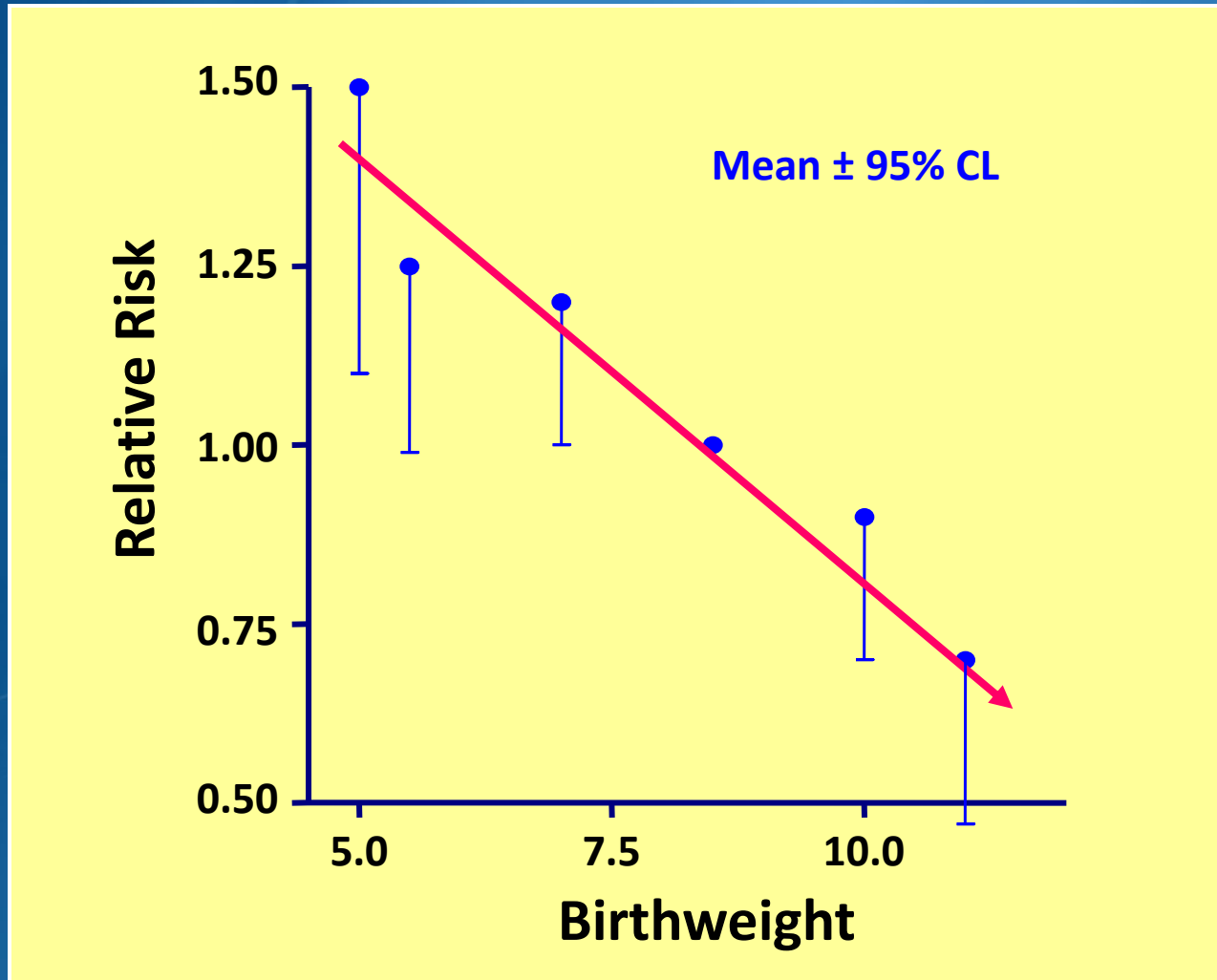
“More than 25 years ago, he started an investigation into why historically poorer areas of England had disproportionately high death rates from coronary heart disease than other areas. He showed that people who had low birth weight have a greater risk of developing coronary heart disease and diabetes, demonstrating a relationship between a mother's nutrition and the health of her children as adults.” - Oregon State Univ



Coronary heart disease death rates, expressed as standardized mortality ratios, in 10,141 men and 5585 women born in Hertfordshire, United Kingdom, from 1911 to 1930, according to birth weight



Age-adjusted Relative Risk of Non-fatal Coronary Heart Disease and Stroke



121,700 American Nurses, self report study BMJ 315:396,1997

Environment & Genes: Epigenetics

A brief introduction to EPIGENETICS...

What is **epigenetics**?

- The study of *heritable* changes in gene function that occur without a change in the sequence of nuclear DNA.
- This includes the study of how environmental factors affecting a parent can result in changes in the way genes are expressed in the offspring.
- The idea has been around since 1942, but only in the last few years has it been observed directly...

Hongerwinter 1944

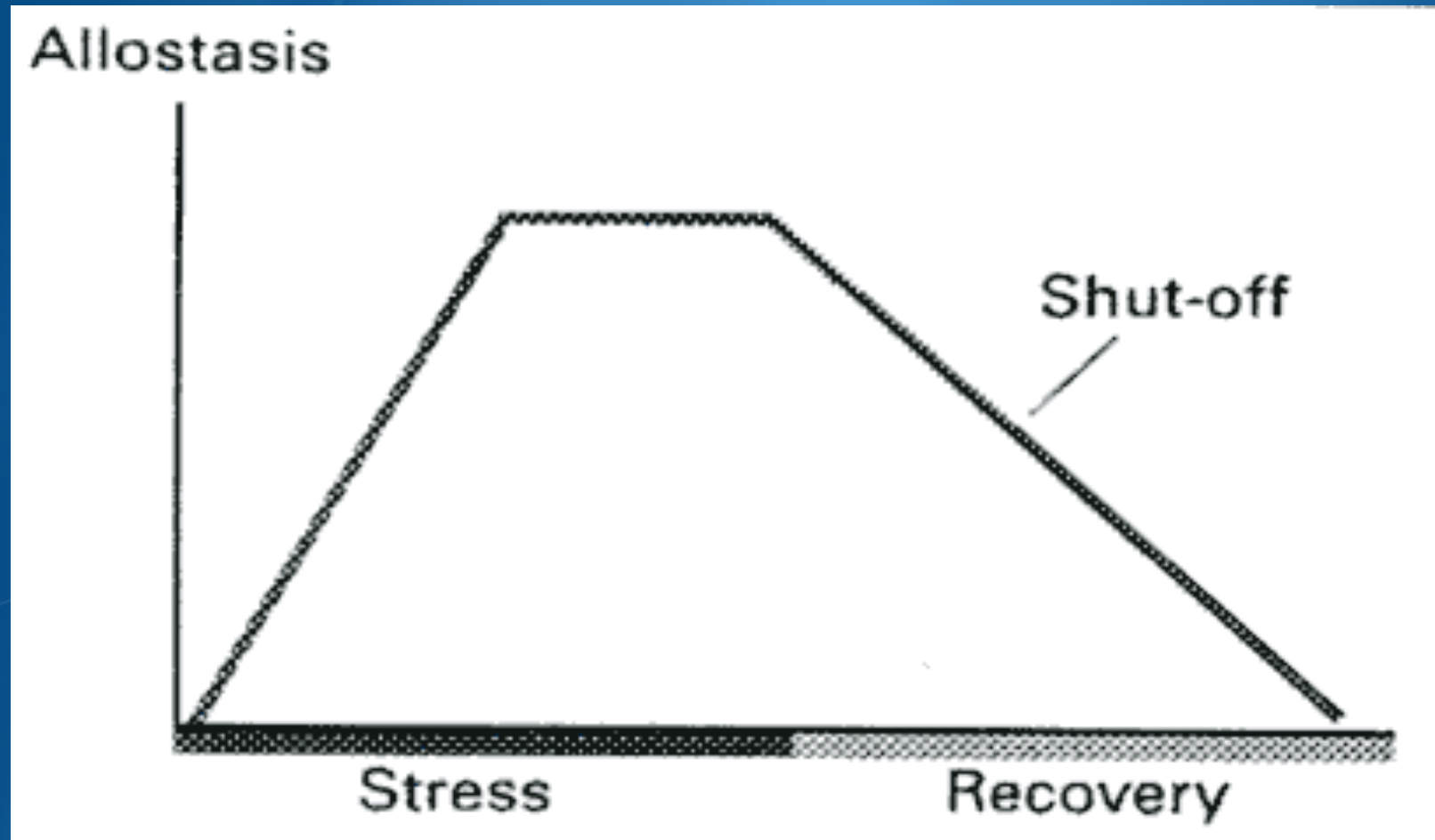
- German's blocked food to the Dutch in the winter of 1944.
- Calorie consumption dropped from 2,000 to 500 per day for 4.5 million.
- Children born or raised in this time were small, short in stature and had many diseases including, edema, anemia, diabetes and depression.
- The Dutch Famine Birth Cohort study showed that women living during this time had children 20-30 years later with the same problems despite being conceived and born during a normal dietary state.



Stress and Allostasis

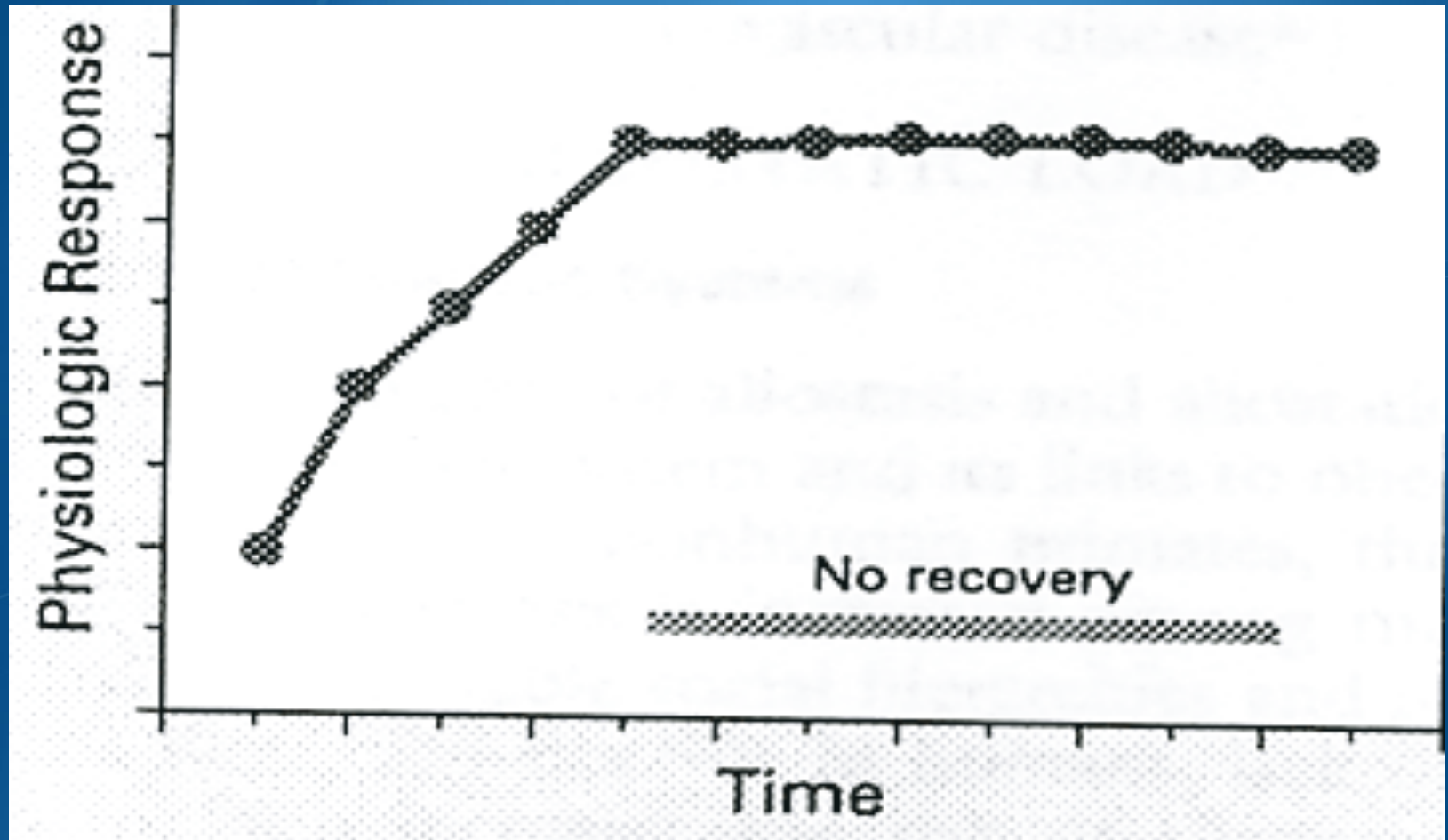
Allostasis:

Maintain Stability through Change



Allostatic Load:

Wear and Tear from Chronic Stress



Stressed vs. Stressed Out

• Stressed

- Increased cardiac output
- Increased available glucose
- Enhanced immune functions
- Growth of neurons in hippocampus & prefrontal cortex

• Stressed Out

- Hypertension & cardiovascular diseases
- Glucose intolerance & insulin resistance
- Infection & inflammation
- Atrophy & death of neurons in hippocampus & prefrontal cortex

The End