

Social Inequalities and CHD

Andrea Z. LaCroix, Ph.D.

Professor of Epidemiology

University of Washington

Fred Hutchinson Cancer Research Center

Group Health Cooperative

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In Search of “State of the Art”

- Brief overview of early studies, early tensions
- Illustrate a variety of epidemiologic approaches
- Explore models and paradigm shifts
- Identify directions for future research

Background

Early Occupational Cohort Studies

- Dupont employees (Pell and D'Alonzo, 1963)
- Chicago Peoples Gas Company (Stamler, 1967)
- Bell System employees (Hinkle, 1968)
- Western Electric Company in Chicago (Shekelle, 1969)

The tension: Was it occupational status (environment) or education (host) that was really associated with higher rates of CHD?

Background

John Cassel's Wade Hampton Frost Lecture

The Contribution of the social environment to host resistance. AJE 104: 1976.

Poorer health is linked to:

- social disorganization of counties
- social instability and poverty levels of census tracts
- levels of family competence
- acculturation
- life stress
- social support

Background

Secular Changes in the Decline in CHD Mortality

- UK Vital Statistics and the Whitehall Study (Rose and Marmot, 1981)
- Evans County Study (Morganstern, 1980)
- U.S. Vital Statistics (Sempos, 1988)

The association of SES with CHD mortality rates shifted from positive to inverse between 1960-1985.

Heart Disease Mortality: England and Wales 1931-71

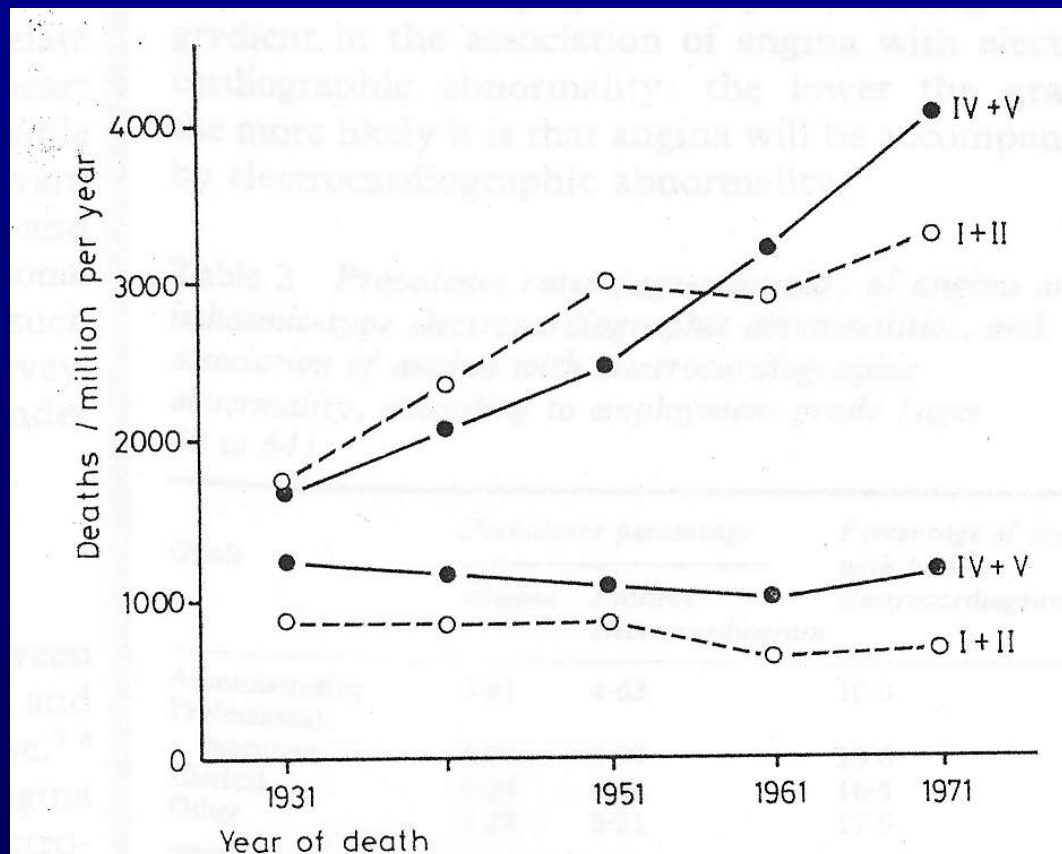
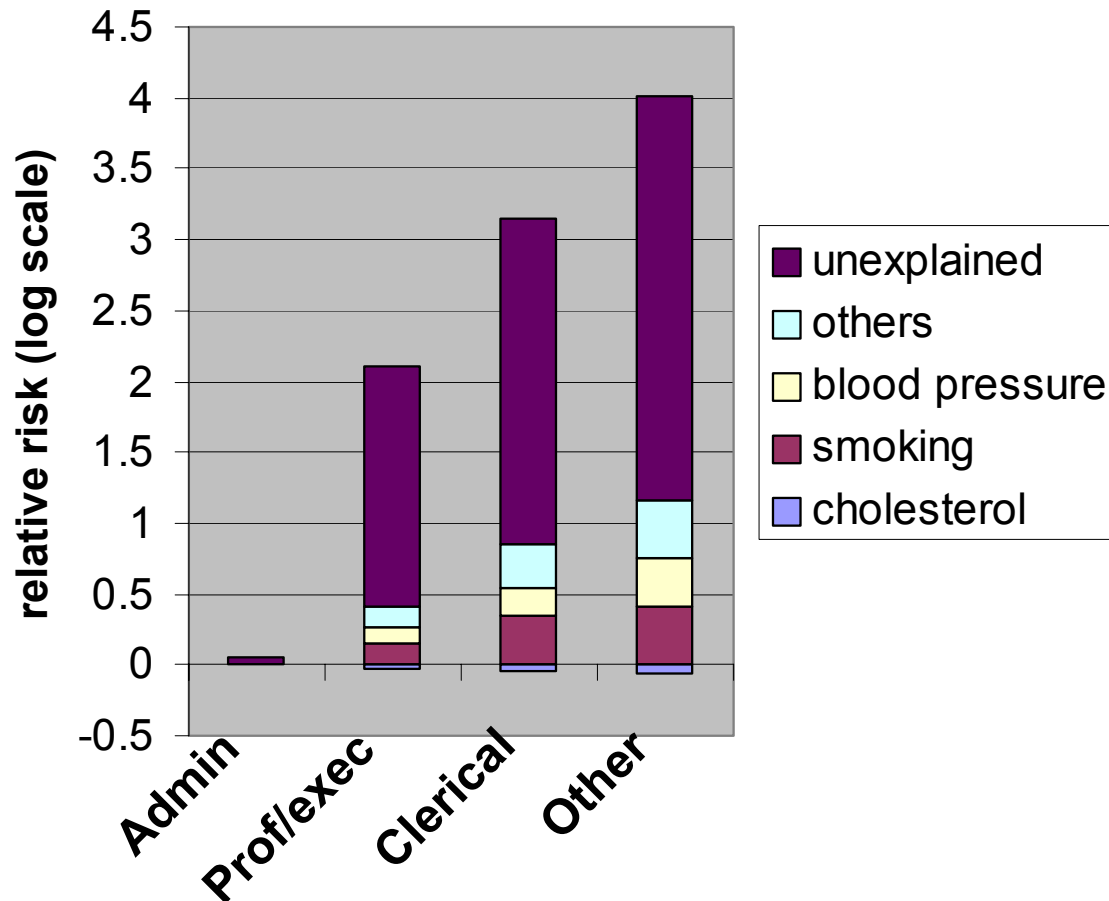


Fig. 1 Mortality from non-valvular heart disease during 1931-71 in men (upper pair of lines) and married women (lower pair of lines) in England and Wales, ages 35 to 64, according to social class (I + II versus IV + V).²⁻⁶

From the perspective of the long-term rise and fall of CHD, social inequalities in mortality trends should not be surprising. Internationally, CHD is a disease of wealthy societies. There is some epidemiological evidence to support the widely held clinical and lay impression that CHD was, in the past, a disease of the affluent within the US and Great Britain, although variations in diagnostic custom make any definitive evaluation of this historical observation impossible. With the mechanization of labor and transportation, widespread availability of inexpensive atherogenic foods, and the growing predominance of smoking in lower socioeconomic status (SES) groups, however, CHD has become a disease of the poor within rich societies. Diverging mortality trends reflect this transition.

Steve Wing, Ph.D., 1988

Hierarchy and CHD Risk Factors: Whitehall Study



Standard risk factors account for 25-30% of social gradient

The tensions:

- Risk factors for CHD explain only part of the SES gradient in CHD risk. However, it could be that the risk factors are measured poorly, not frequently enough, or that we lack knowledge of all the involved risk factors to explain the SES gradient.
- Many of the risk factors for CHD are behavioral and thus, elective. Therefore, if people in lower SES strata would adopt healthier lifestyles, there would be no SES gradient in CHD risk.

SES and CHD: Can risk factors explain the association?

Income quintile	CVD Mortality		Fatal and non-fatal MI	
	Age-adjusted	All risk factors	Age-adjusted	All risk factors
1 (lowest)	2.66	0.70	4.34	2.83
2	1.90	0.74	2.25	1.86
3	0.69	0.34	2.25	1.91
4	0.72	0.42	2.18	2.12
5 (highest)	1.00	1.00	1.00	1.00

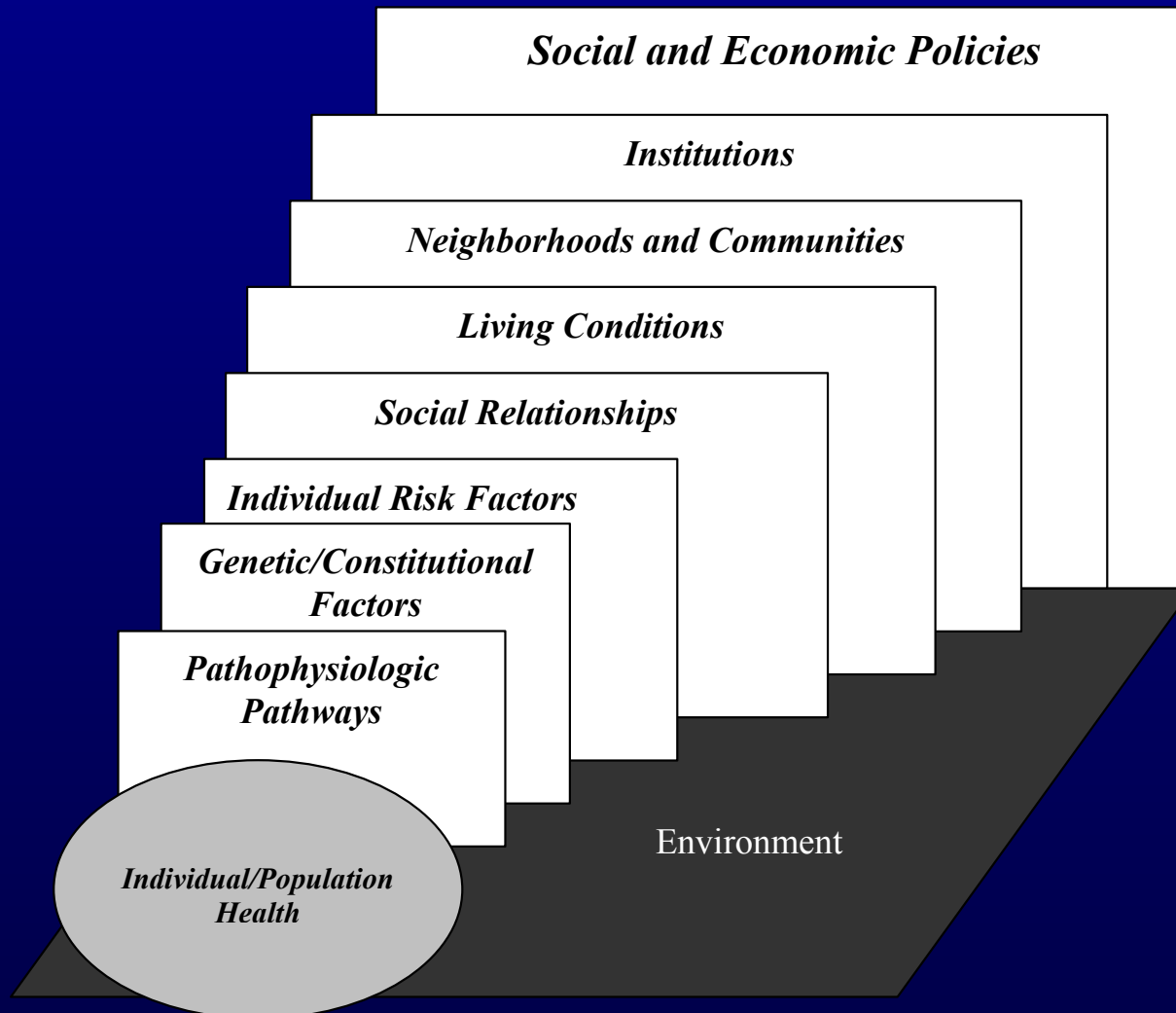
Lynch, Kaplan, Cohen, et al. Am J Epidemiol 1996.

Adjusted for: age, fibrinogen, HDL, apo-B, ferritin, copper, hair mercury, triglycerides, blood leukocytes, hemoglobin, FBG, SBP, cardiorespiratory fitness, BMI, ht., smoking, ETOH, physical activity, depression, hopelessness, marital status, social participation, quality of social support.

Public health interventions in cardiovascular disease have focused on attempts to change behavior, especially in diet and smoking. The implicit hope has been that, despite the more ready acceptance of health promotion messages by higher SES groups and their greater resources and flexibility for implementing behavior change, healthy behaviors will eventually become culturally valued and will trickle down to the lower SES strata. This assumes that healthful products are available in stores in poor communities, that they are affordable, and that those with less income and education and lower prestige jobs have other healthier options than, say, smoking. In any case, this strategy suffers from the moral problem of accepting a delay of perhaps generations before healthy behaviors will be practiced to a similar extent in all segments of society.

Steve Wing, Ph.D., 1988

Social Ecological Model



From Kaplan 1999

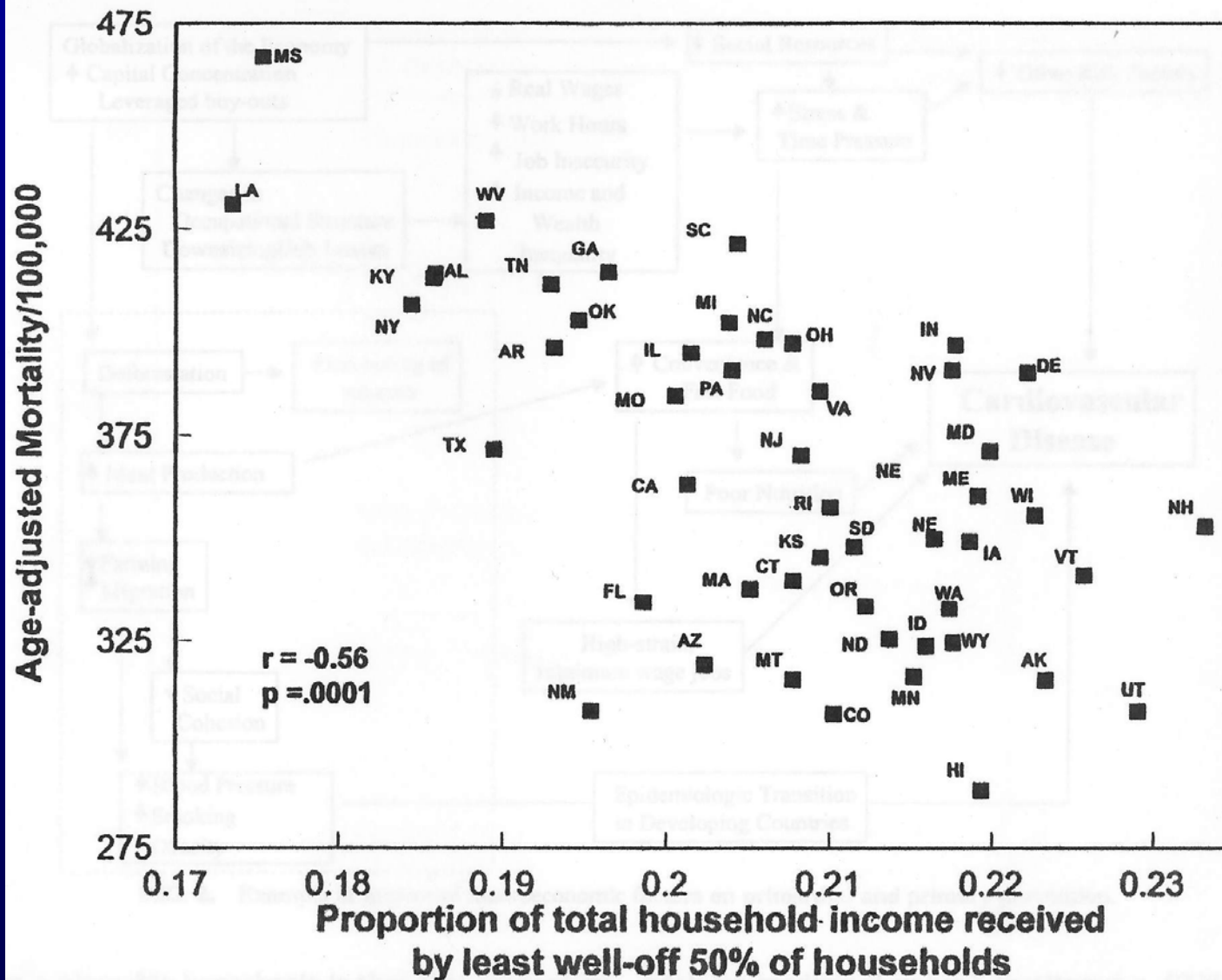


FIG. 1. Income inequality and cardiovascular mortality by state in the United States, 1990.

SOCIOECONOMIC CONSIDERATIONS IN CARDIOVASCULAR DISEASE PREVENTION

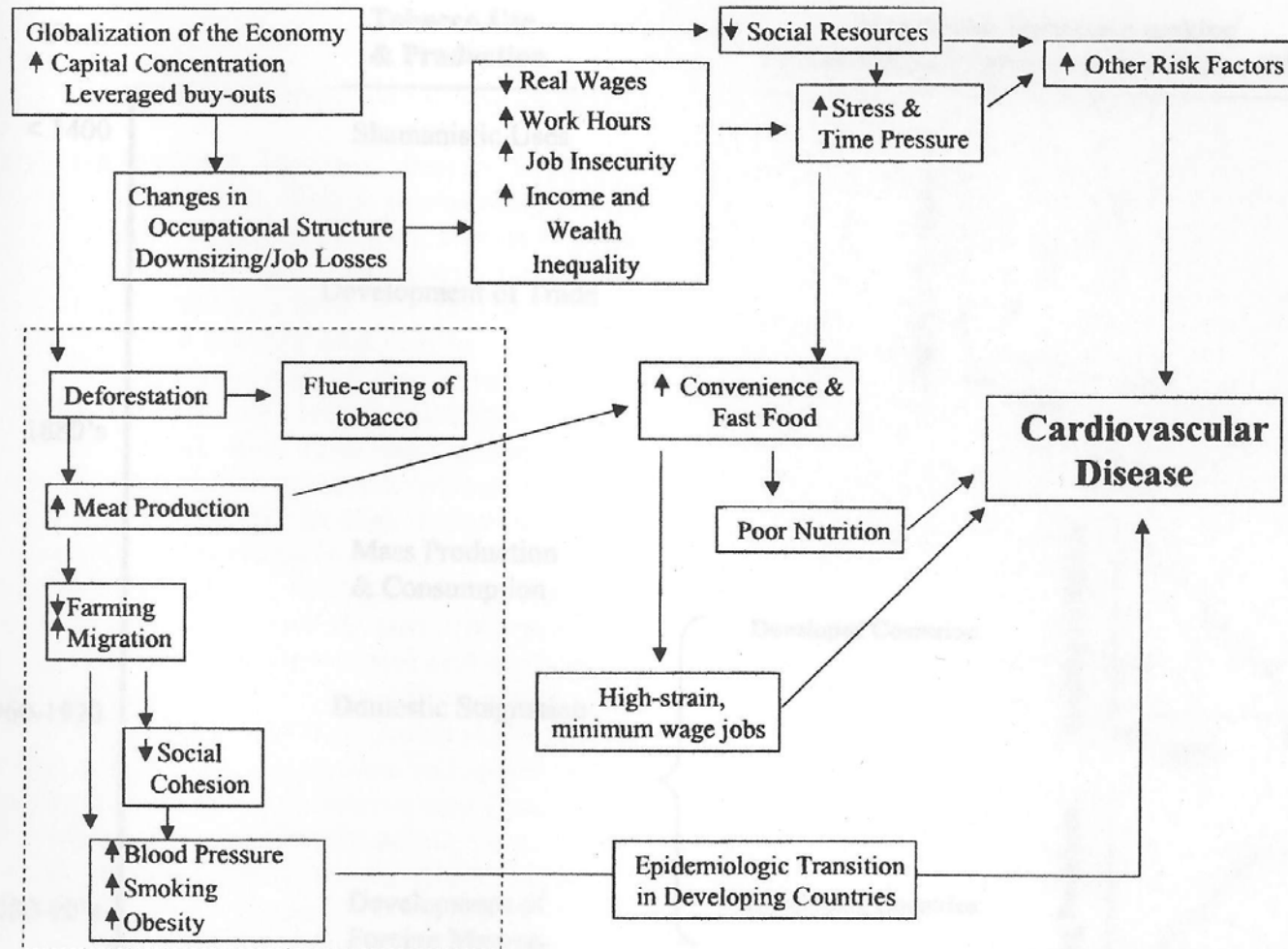


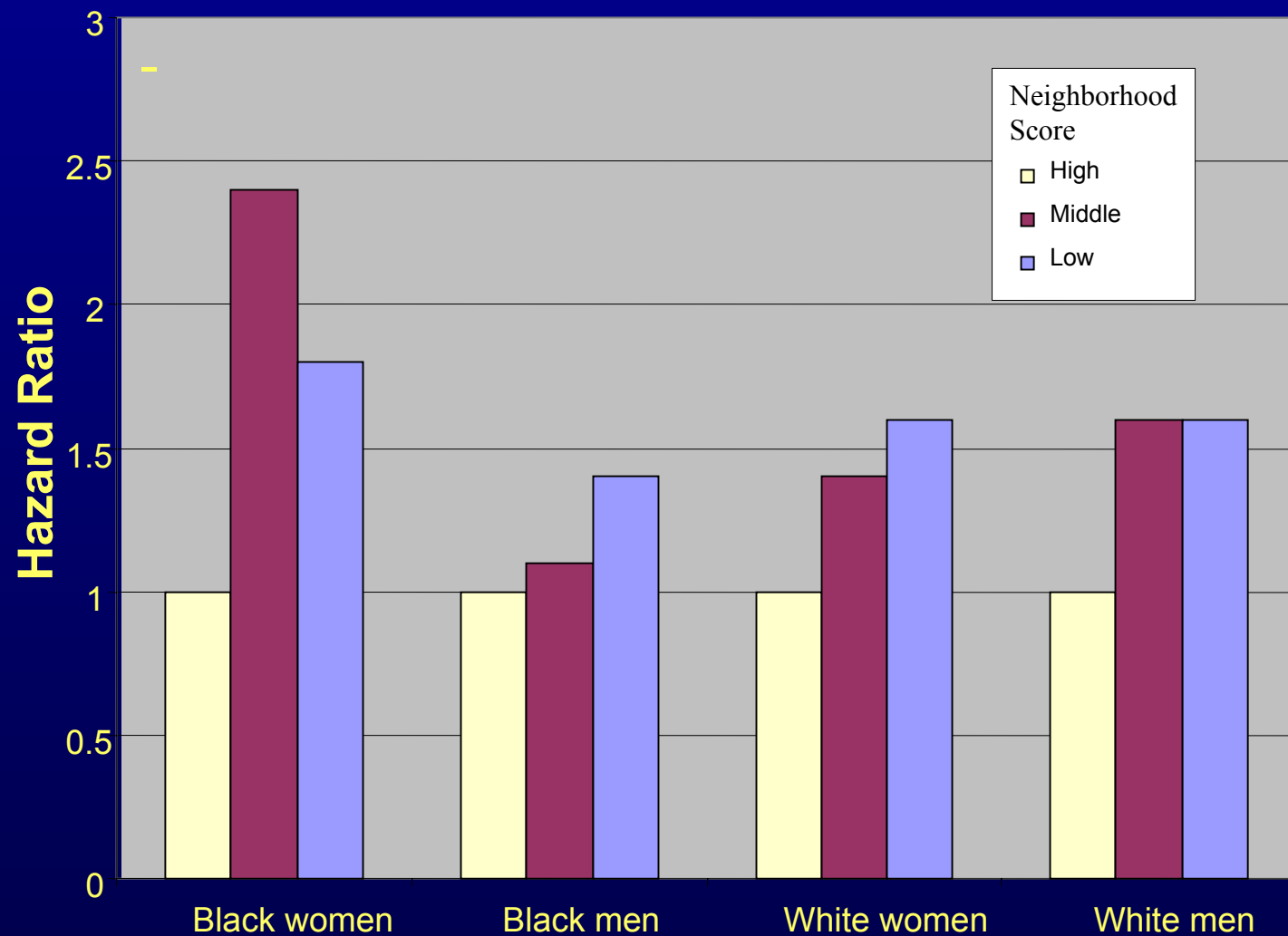
FIG. 2. Example of impact of macroeconomic factors on primordial and primary prevention.

Neighborhood characteristics used to define neighborhood score

	Whites				Blacks		
<i>Characteristic</i>	1 (Low)	2 (Middle)	3 (High)		1 (Low)	2 (Middle)	3 (High)
No. of study participants	3,085	3,148	3,209		1,247	1,150	1,170
No. of neighborhoods	137	126	126		49	71	86
Median neighborhood score	-0.8	2.2	5.8		-7.2	-4.1	0.9
Median household income (\$)	29,100	36,500	47,200		11,100	17,200	30,000
Median value of housing units (\$)	70,900	85,600	103,100		33,000	39,500	54,000
Households with interest, dividend, or rental income (%)	36	50	62		4	13	20
Adult residents who completed high school (%)	70	84	93		48	62	80
Adult residents who completed college (%)	9	18	38		7	14	30
Employed residents with executive, managerial, or professional occupations (%)	16	27	41		13	18	32

Diez Roux, Merkin, Arnett et al. N Engl J Med 2001;345:99-106.

Hazard Ratios for CHD According to Neighborhood Scores



Diez Roux, Merkin, Arnett et al. N Engl J Med 2001;345:99-106.

Karasek Job Strain Model

SPECIAL SECTION: JOB STRAIN AND CVD RESEARCH

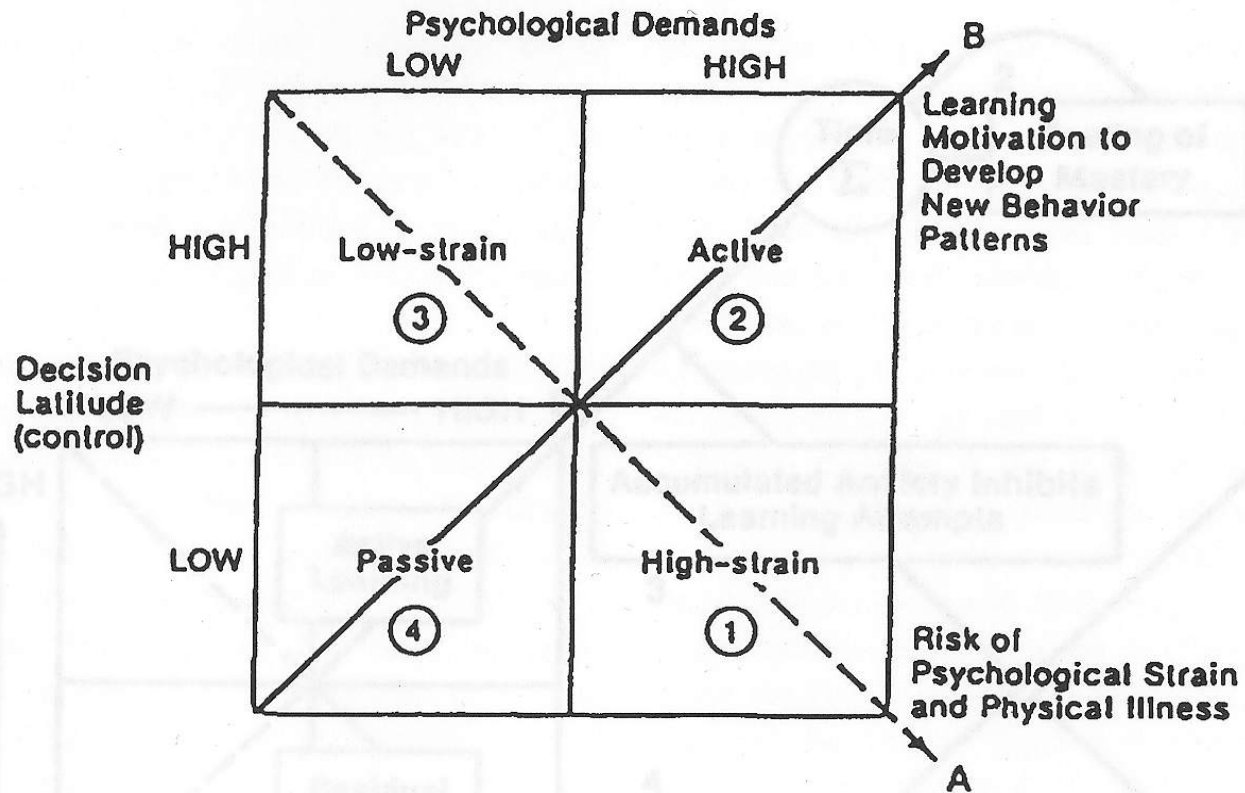
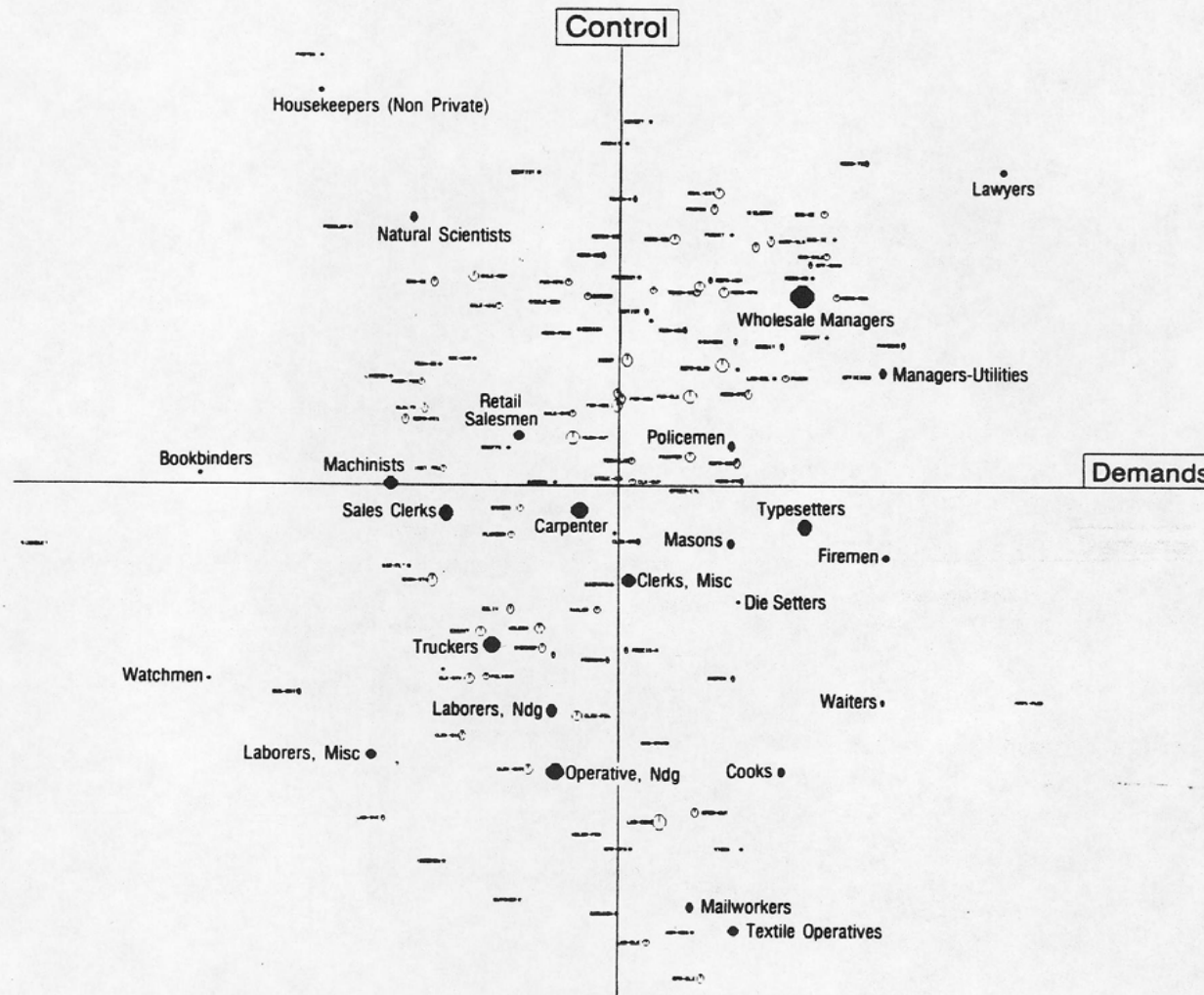


Figure 1. Psychological demand–decision latitude model.

Figure 5.3

Occupational Distribution of Framingham Men By Mean Karasek Job Scores



High demands and low decision latitude

Odds Ratios for non-fatal MI in
occupational strata of men 45-64

		Low Demands		High Demands	
Low decision latitude			OR (95% CI)		OR (95% CI)
		manual	1.6 (0.9 - 3.0)	manual	10.0 (2.6 -38.4)
		non-manual	1.0 (0.6 - 1.7)	non-manual	1.5 (0.6 - 3.5)
High decision latitude					
			OR (95% CI)		OR (95% CI)
		manual	1.0	manual	1.2 (0.5 - 3.1)
		non-manual	1.0	non-manual	1.2 (0.9 - 1.6)

Adjusted for smoking, BMI, and high blood pressure.

Hallqvist, Diderichsen, Theorell et al. Soc Sci Med, 1998.

Job strain and Low SES: Odds Ratios for non-fatal MI among employed men ages 45-64

	<i>Odds Ratio (95% CI)</i>
No Job Strain, High SES	1 (reference group)
Job Strain, High SES	1.4 (0.6-3.2)
No Job Strain, Low SES	1.2 (0.9-1.7)
Job Strain, Low SES	6.5 (2.1-20.3)

Adjusted for smoking, BMI, and high blood pressure.

Hallqvist, Diderichsen, Theorell et al. Soc Sci Med, 1998.

Biologic Pathways and Intermediate Outcomes

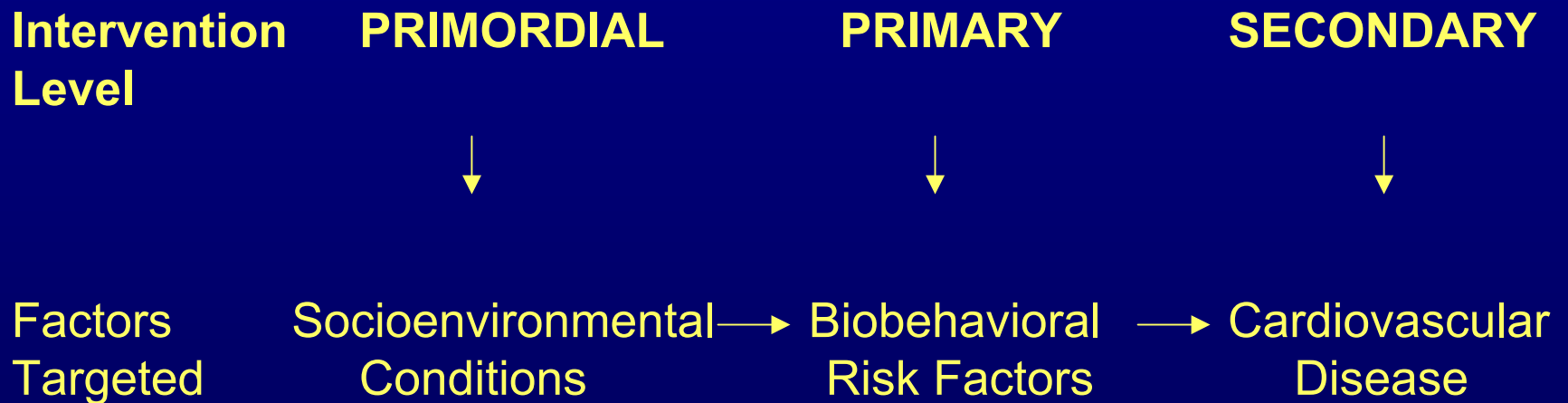
Social Factors:

- Low SES
(employment grade)
- Job control
- Social isolation
- Laboratory mental stressors

Biologic responses:

- Lipoprotein levels
- Fibrinogen
- BP
- Heart rate variability
- Inflammation markers (IL-6, TNF α , IL-1RA, CRP)
- Human heat shock protein 60
- von Willebrand factor

Level of health interventions and factors targeted



James SA. Preventive Medicine 1999;29:S84-S89.

Social Inequalities and CHD

Directions for Future Research

- Determine the causal pathways that link upstream social and economic policies to CVD risk factors, morbidity and mortality.
- Aggressively disseminate this information.
- Public health professionals need to make their voices heard.

“...medicine is a social science and politics
nothing but medicine on a grand scale.”

Rudolf Ludwig Karl Virchow