

Paddling Against the Current: Upstream Determinants of Population Health

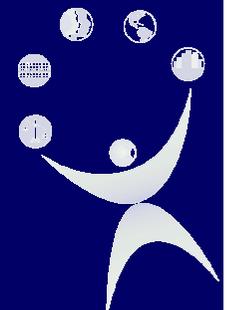


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- Social epidemiology is booming, and a new interdisciplinary field called “population health”-- partially derived from social epidemiology, but more broadly bridging social and biological knowledge -- is vital and developing rapidly.
- Major progress reflected in the WHO Commission on Social Determinants of Health which has moved beyond the Western European/North American-centric view of social determinants of health, large-scale efforts across the EU directed at increasing health equity, and across virtually all continents, re(new)ed interest in a more nuanced understanding of the determinants of health and health inequities that crosses disciplinary and methodological divides.
- At the same time, the 800 pound genomic gorilla has led many interested in social determinants of health to hang on for dear life as funding streams are diverted and promoters of genomic discoveries issue promissory notes that are unlikely to be paid.
- Perhaps an even greater threat are the challenges to what we do posed by data and analytic limitations that have to some of us become more and more evident.

Let me explore some of these challenges by reference to a series of studies I and my colleagues have been involved in over the last quarter of a century.

And , I will close with some speculation about ways to move from our regression-based models of the world that we are so preoccupied with to a more dynamic and simulation-based modeling approach to studying the links between social divides and health divides.

Poverty Area Characteristics

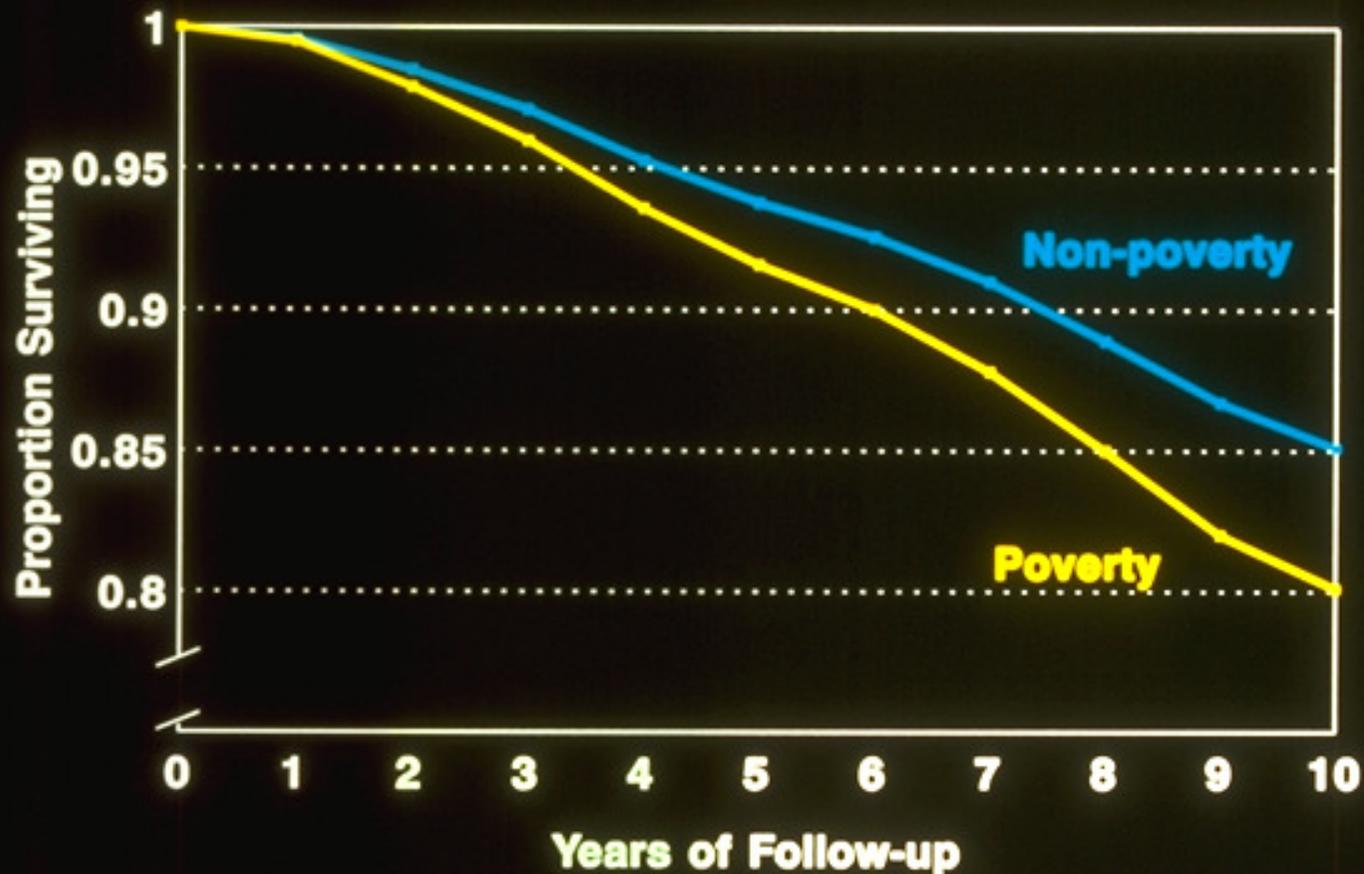
Example 1

Oakland, CA: 1965

41% of the Population:

Unemployed Males	66%
Unemployed Females	61%
General Assistance Recipients	94%
Aid to Families with Dependent Children	85%
Aid to Disabled	73%
Police Workload	65%
TB Cases	68%
Poor Housing	75%
Housing without Private Bath	89%

Age-adjusted Survival by Poverty Area Residence Alameda County Study: 1965-1974, White Females



Survival curve from Cox model, estimated at age=60

Since the late 1980's there has been an explosion of epidemiologic research on associations between area/neighborhood/spatial characteristics and health, behavioral, and social outcomes

Most of the controversy over these studies concerns analytic issues, choice of appropriate analytic tools (e.g. HML), choice of appropriate confounders, and causal claims.

Increasingly, attention is being paid to variations in the distributions of resources such as the availability of good food, or opportunities for physical activity in these studies.

But, little attention is being paid to the processes that create poverty areas, or for that matter areas with any particular social characteristics (e.g., high affluence areas, high proportion of immigrants, etc.)—

Thus, in social epidemiology we have essentialized neighborhood characteristics – studying them in an ahistorical, apolitical, and asocial way,

and thereby **not studying the forces and processes that produce** these neighborhood characteristics

Neighborhoods change.....



H. Frumkin, personal communication

COLFAX AVENUE, DENVER, COLORADO: Done in association with Space Analytics, LLC for Colfax on the Hill, Inc., funded in part by the Denver Foundation

The major forces that change neighborhoods are not endogenous forces that reflect people's individual choices and utilities, as much as they are exogenous forces such as social exclusion, zoning, development, transportation, housing policy, lending practices, and tax policy.

Yet, instead of studying these forces, the major direction of many/most neighborhood studies is on estimating area effects on health after eliminating the effects of characteristics of individuals in these areas –

if we want to advance this area we will need to devote the same energy to studying the forces that shape spatial contexts as we have devoted to removing these compositional effects. Furthermore, as these neighborhood composition often represent the effects of macro-level policies and informal practices, one wonders if “controlling” for them is really the right approach.

Sadly there have been relatively few attempts to study the forces that distribute risks and resources and people across spatial areas, or on the impact of these forces on the everyday lives and more proximal exposures to individuals –

New data and linkages with city planners, urban sociologists, geographers, political scientists, and others will be necessary!

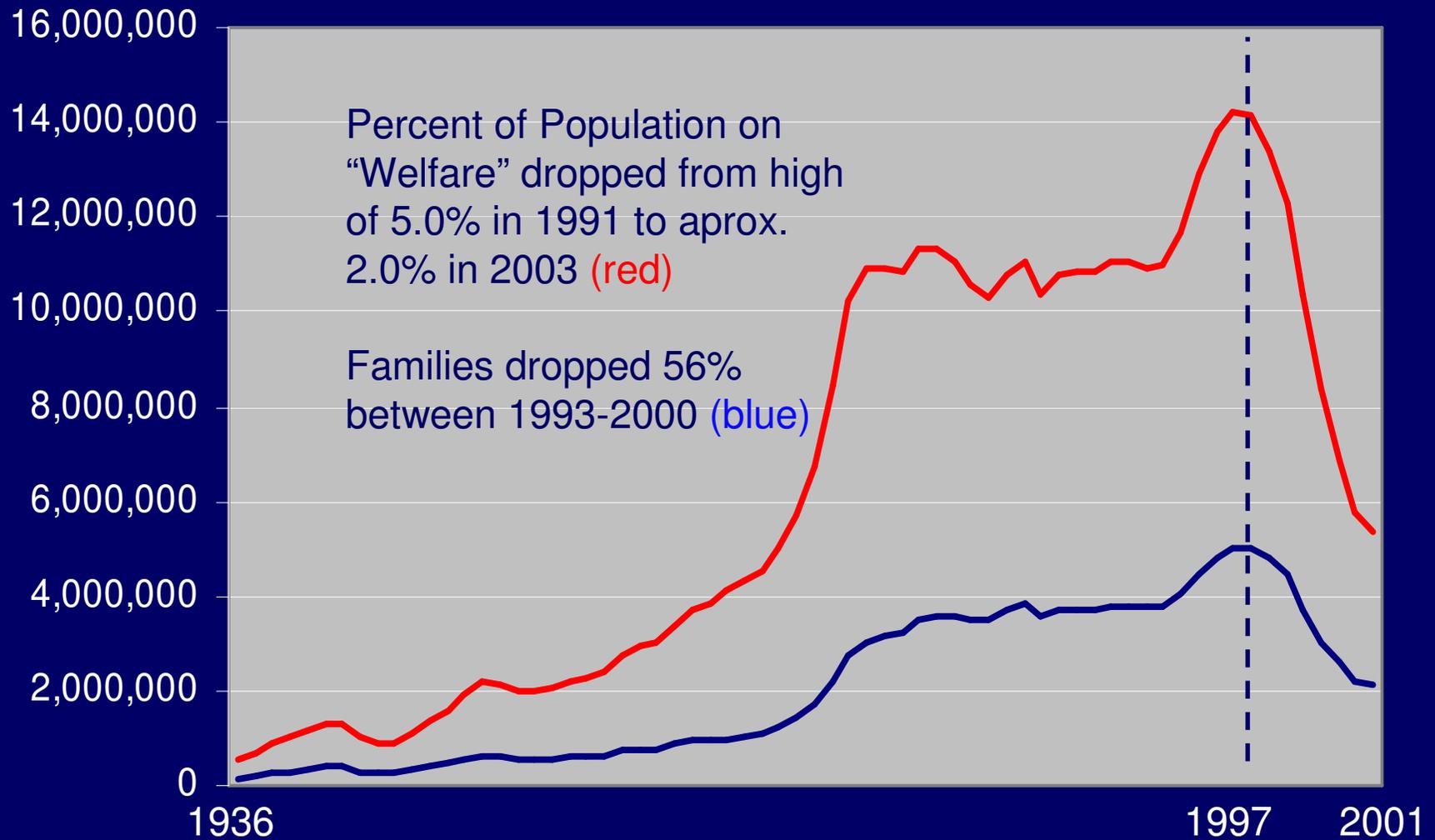
Example 2: Welfare Reform and the Health of Poor Women

Kaplan GA, Siefert K, Ranjit N, Raghunathan TE, Young EA, Tran D, Danziger S, Hudson S, Lynch JW, and Tolman R. The health of poor women under welfare reform. *American Journal of Public Health*. 2005 Jul; 95(7):1252-8. <http://hdl.handle.net/2027.42/55350>.

In many countries over the last decade, an unholy alliance of neo-liberal and other interests has led to a dramatic reshaping of the social contract as it applies to poor women with children— with the biggest example being that of “welfare reform.”

In the US, former President Bill Clinton stated in 1993 that these changes would be the “end of welfare as we know it.”

Welfare Case Load (Families and Individuals): 1936-2001



Draconian Policy Change for poor women with children in the US:

- States had to move minimum of 50% of all families on aid into work or work-prescribed activities
- Parents required to participate in work-related activities unless they had a child < 1 year
- Cash assistance limited to no more than 5 years over lifetime

“Welfare reform” targeted poor women who often had:

- Few job skills
- Long histories of unemployment
- Psychosocial problems
- Difficult family situations
- Problematic neighborhoods
- Transportation problems
- Lack of day-care for their children
- etc.

With, for the most part, little training and support they were thrown into a job market that offered:

- Insecure employment
- Low-skill positions with little chance for advancement
- Work schedules that often varied from week-to-week, and frequently involved shift work or night work
- Jobs that were far removed from where they lived
- Wages that kept around 50% of them below poverty level

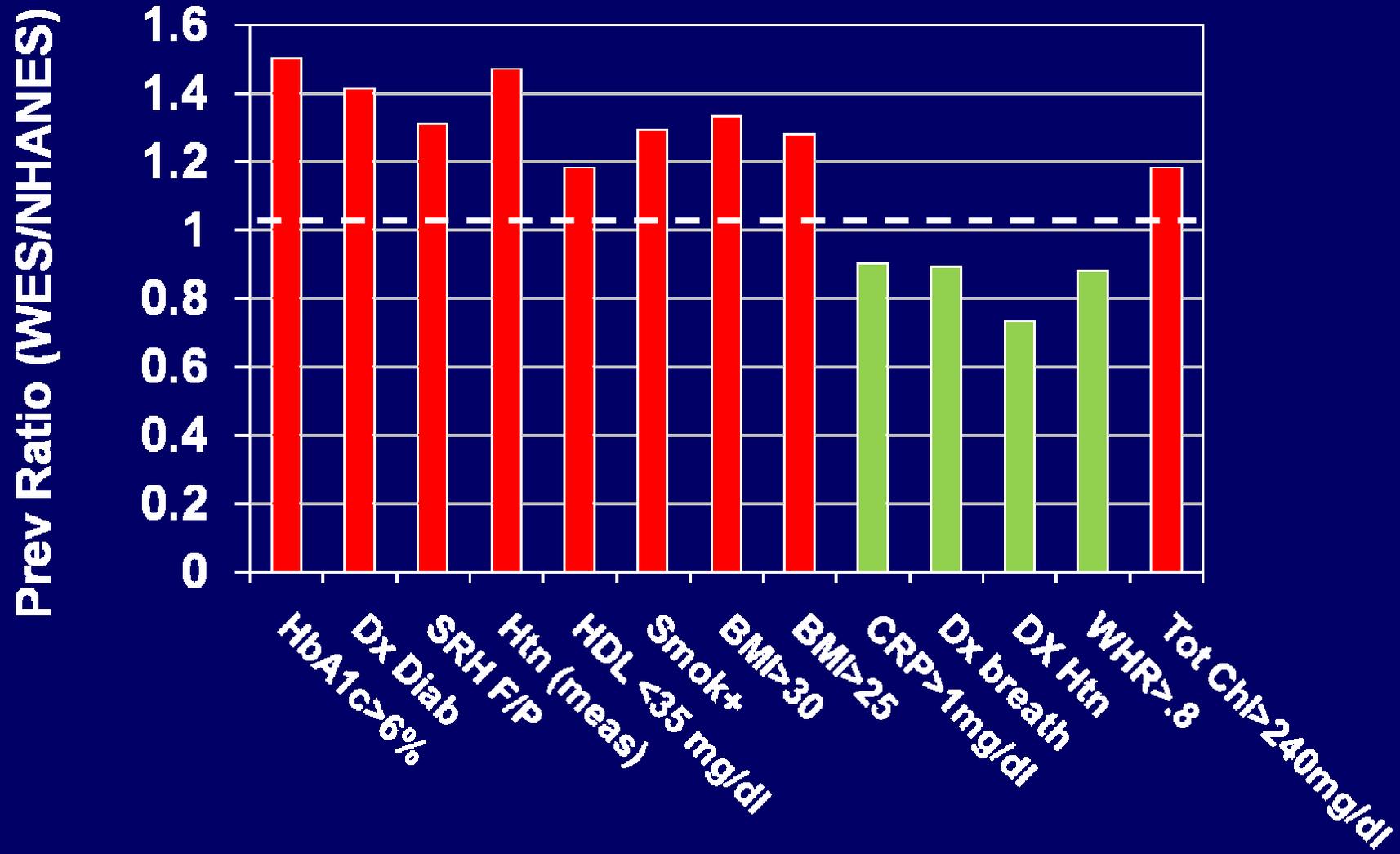
Proponents of welfare reform saw it as a way to end, in their view, dependence on government “handouts” that (supposedly) reduced individual motivation to work— the dramatic reductions in case-load were widely touted as evidence of great success,

On the other hand, consider the fact that an already vulnerable population is suddenly exposed to a new set of material and psychosocial risks—

WOULDN'T WE EXPECT HEALTH EFFECTS?

Yet, there were **no** comprehensive studies in the US— that would pass the scrutiny of epidemiologists- planned before or after welfare reform that examined the health impact of these large changes or more proximal pathways that would link welfare reform to better or worse health!

Prevalence of conditions, disease markers, risk factors, and self-reported medical diagnoses: Women's Employment Study (WES) after Welfare Reform vs. NHANES women before Welfare Reform



A major social intervention impacted millions of poor families with many features that might be expected to have had a deleterious effect on their health.

No consideration was given to possible health effects, by and large no data on health impact were collected, and a few studies carried out after the fact suggest negative health impacts.

--At the policy level, a significant failure to target health measures

--At the epidemiologic level, a significant failure to foresee this policy change and to lobby for the addition of health measures.

Thus, a major lost opportunity to, in general, understand the impact of “upstream” policies on health, and, specifically, to use epidemiologic tools to understand the pathways that might link welfare reform to health changes, and to provide a more balanced evaluation of the impact of welfare reform through the inclusion of health outcomes.

Example 3: The Impact of Civil Rights Legislation on the Health of African-American Women

Kaplan GA, Ranjit N, Burgard S. Lifting Gates--Lengthening Lives: Did Civil Rights Policies Improve the Health of African-American Women in the 1960's and 1970's? In: House JS, Schoeni RF, Kaplan GA, Pollack H. (eds) Social and Economic Policy as Health Policy. New York: Russell Sage, 2008.



The Civil Rights Act of 1964 and the Voting Rights Act of 1965

- arguably represent the most important legislation regarding the nexus of race and society in the US since the Civil War

“[they] ...transformed the shape of American race relations. Supporters of the Civil Rights Act of 1964 sought, at a minimum, the elimination of segregation of the races in publicly supported schools, hospitals, public transportation, and other public spaces, and an end to open and blatant racial discrimination in employment practices. Judged in those terms, the act is a remarkable success story. If ever any piece of legislation showed the power of the central government to change deeply entrenched patterns of behavior, it is the Civil Rights Act of 1964. Together..[they] broke once and for all the Jim Crow legacy of post-Reconstruction South and largely ended the overt and legally sanctioned forms of discrimination against blacks that had been found throughout the nation. In terms of the law, blacks were no longer second-class citizens.” (Grofman 2000)

FIGURE 6.1 / Percentage of Women Thirty-five to Sixty-four Years Old Reporting Private-Household Service Work as Their Occupation, by Racial Group, Region, and Year^a

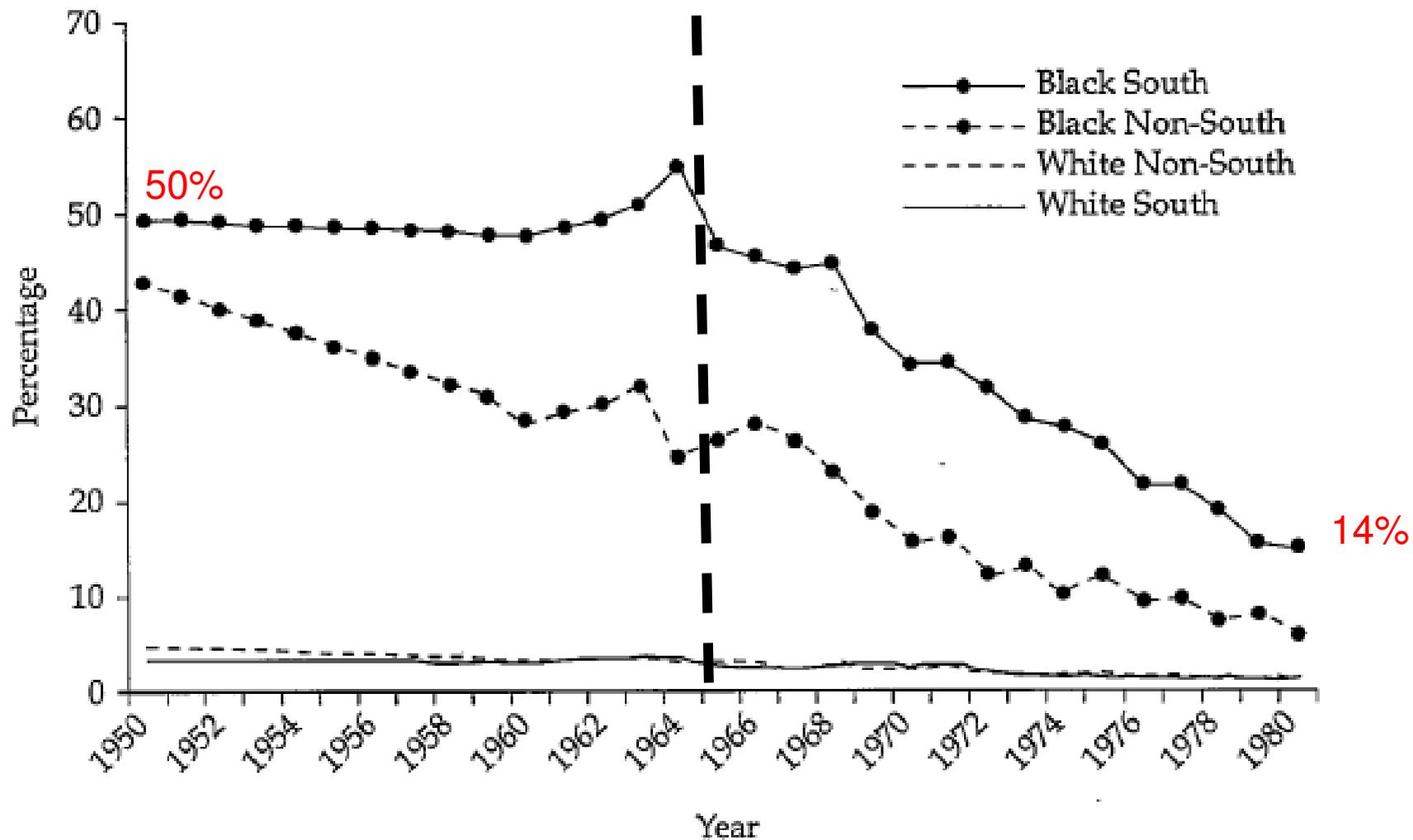
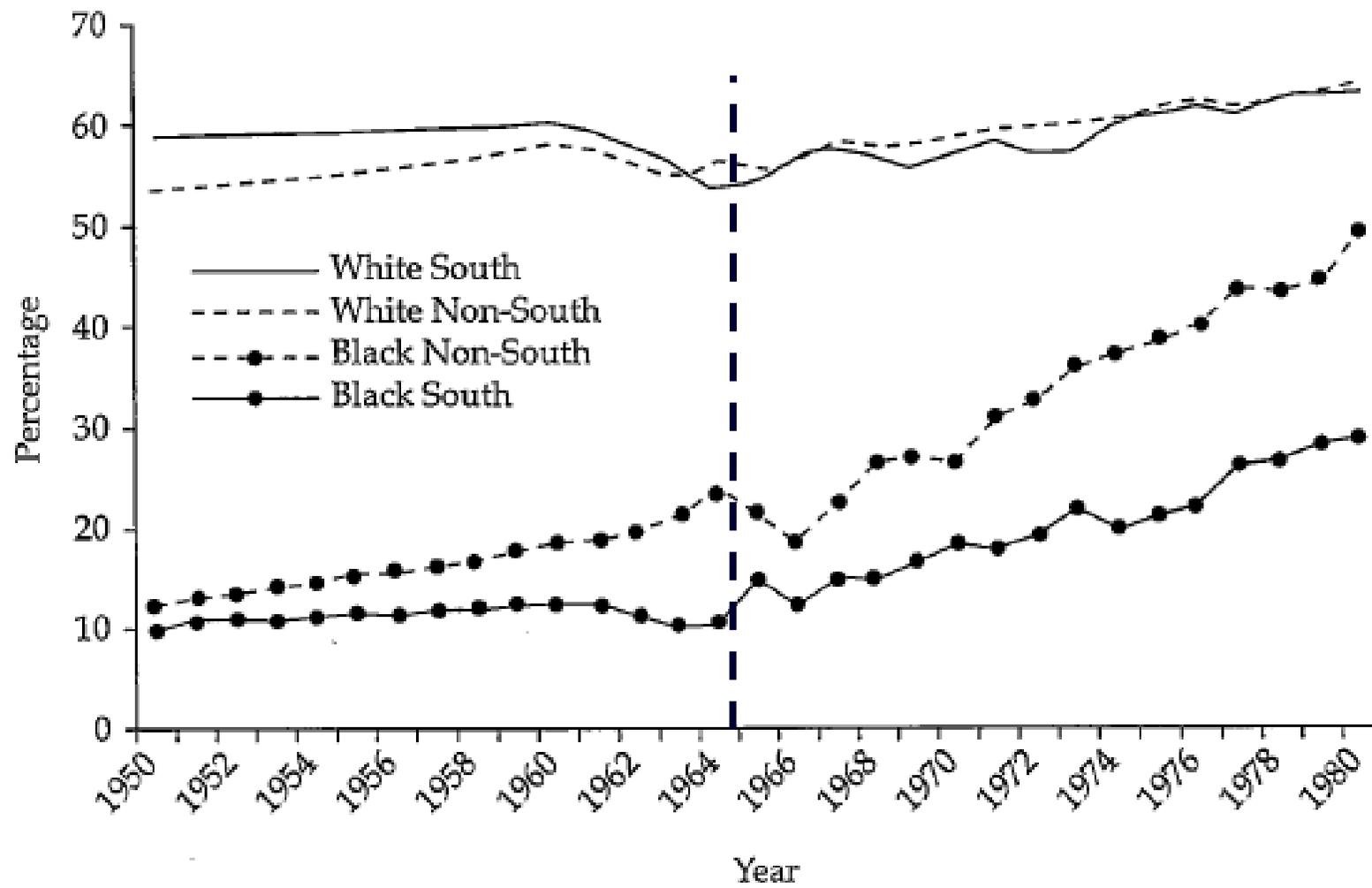


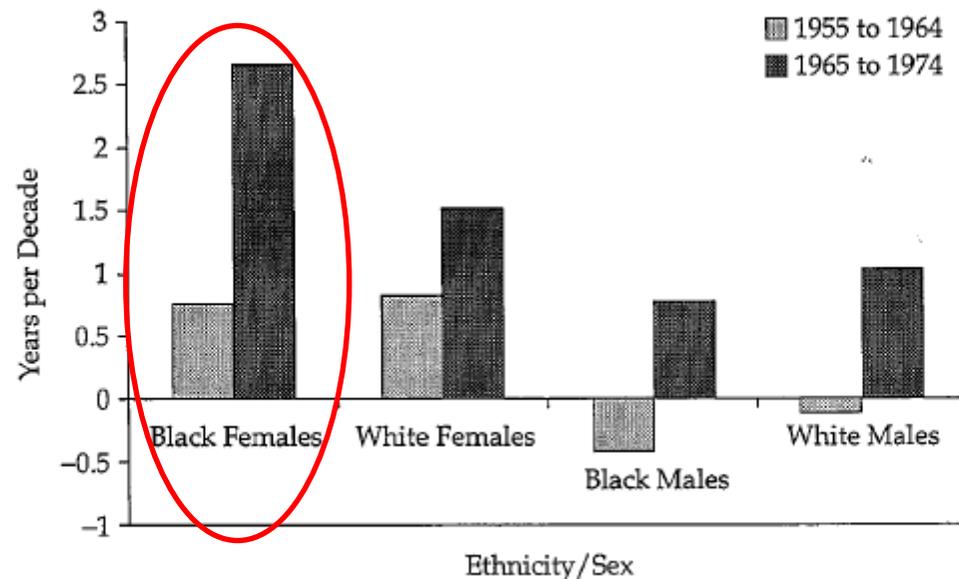
FIGURE 6.2 / Percentage of Women Thirty-five to Sixty-four Years Old Reporting a White-Collar Occupation, by Racial Group, Region, and Year^a



These dramatic occupational changes led to major economic gains for African-American women— in the decade following CR legislation, the wages of 35-49 year-old African American women increased to 103% of white women of the same age!

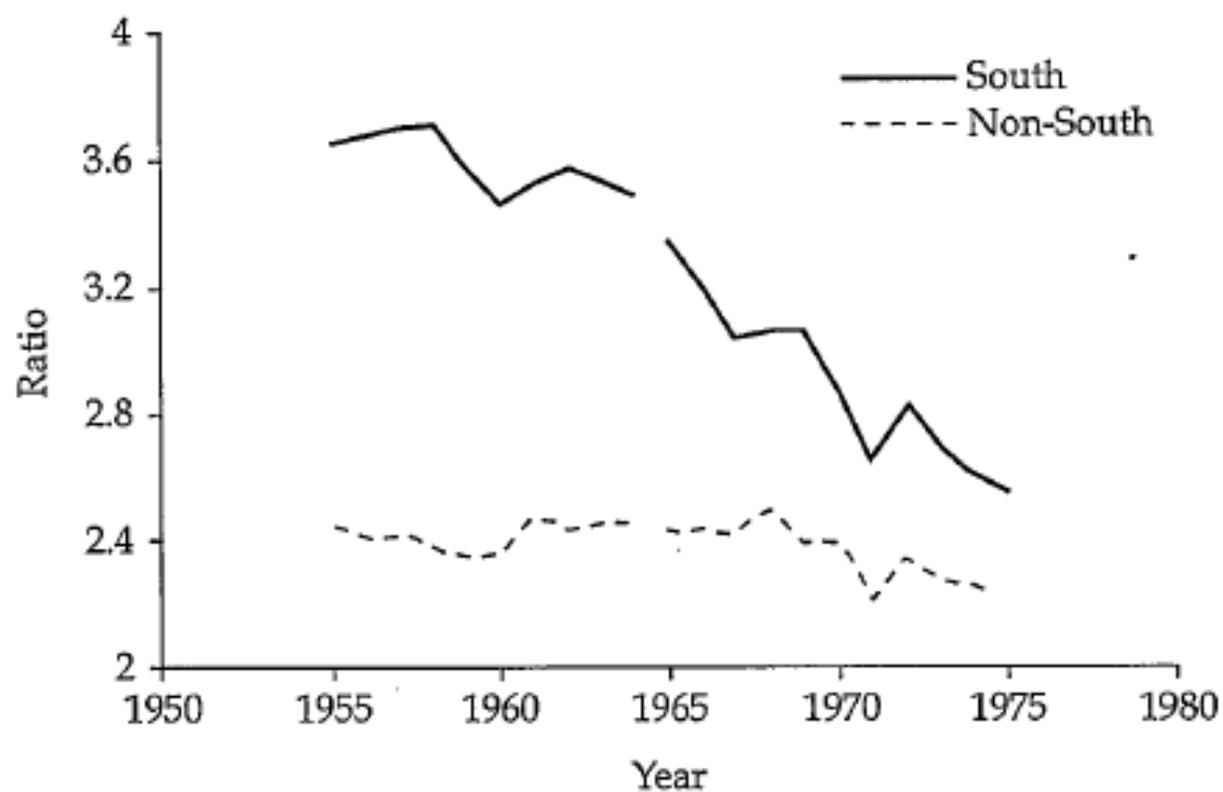
And, according to our analyses, their health improved as well:

Figure 6.7 / Change (Years per Decade) in Life Expectancy at Age Thirty-five in the United States: 1955 to 1964 and 1965 to 1974



Source: Authors' calculations.

FIGURE 6.10 / Trends in Ratios of Black-White Mortality from Heart Disease (Ages Thirty-five to Sixty-four) for Females, By Region, 1955 to 1974



Source: Authors' calculations.

So, we observe major changes in health that are temporally associated with a major policy/legislative change. If you believe the connection, the question still remains “how do policy changes lead to health changes?”

While one might be able to argue that the changes are biologically plausible, the pathways that lead to these changes remain opaque because we have no useful information on traditional risk factors (smoking, blood pressure, cholesterol), or psychosocial factors (job control, self-esteem), or others factors that might in the be the pathways.

Thus, we have a major change in the opportunity landscape for a socially marginalized and excluded group but we are unable to understand putative health effects because critical data to do so are absent.

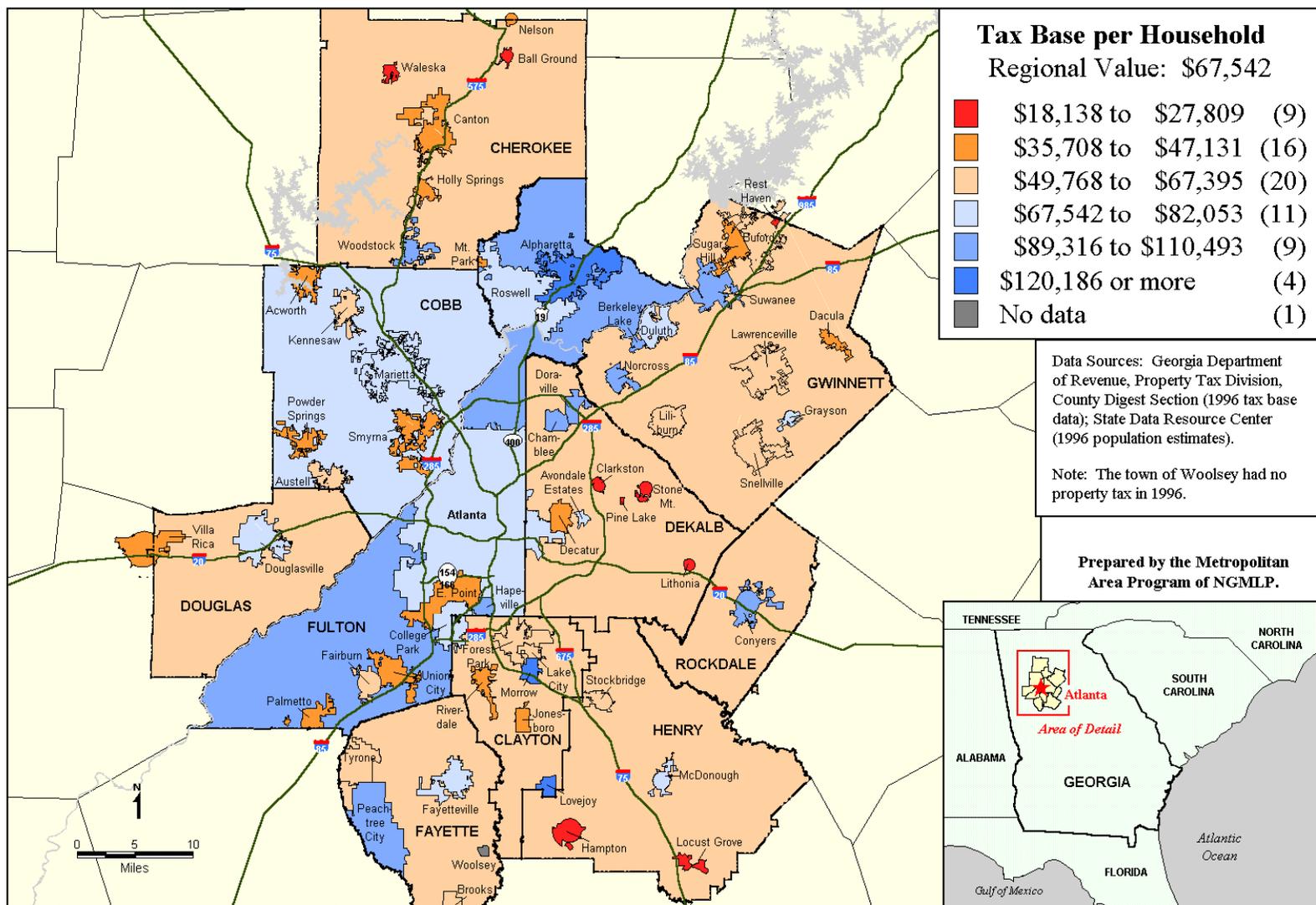
If social epidemiology is to make the “leap” to understanding how non-health policies such as those related to equal opportunity have an effect on health, we will have to lobby for the collection of the kinds of data that will strengthen our inferences about the links between upstream policies, health, and health inequalities.

Example 4: Urban Planning and Health Disparities

Hutson M, Kaplan GA & Ranjit. N Metropolitan Fragmentation and Health Disparities:
Is There a Link? (2008, submitted)

Atlanta, GA Metropolitan Area

Total Tax Base Per Household by Municipality and County Unincorporated Area, 1996



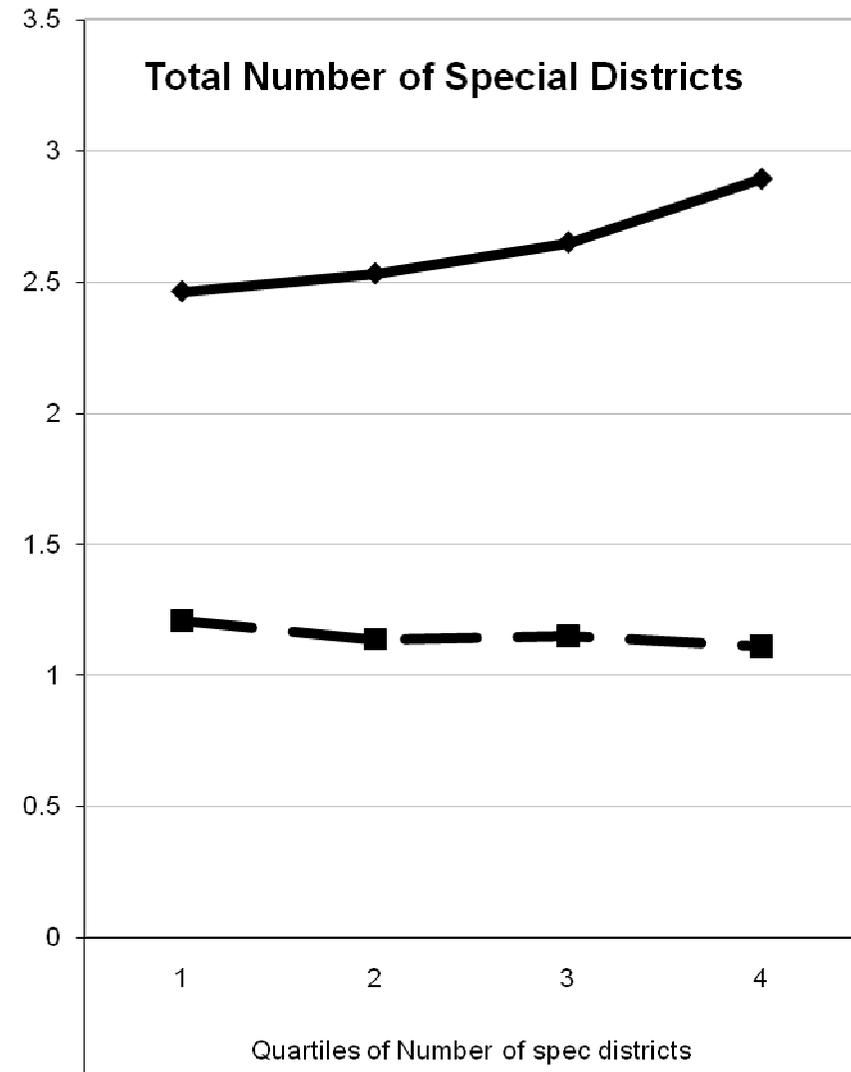
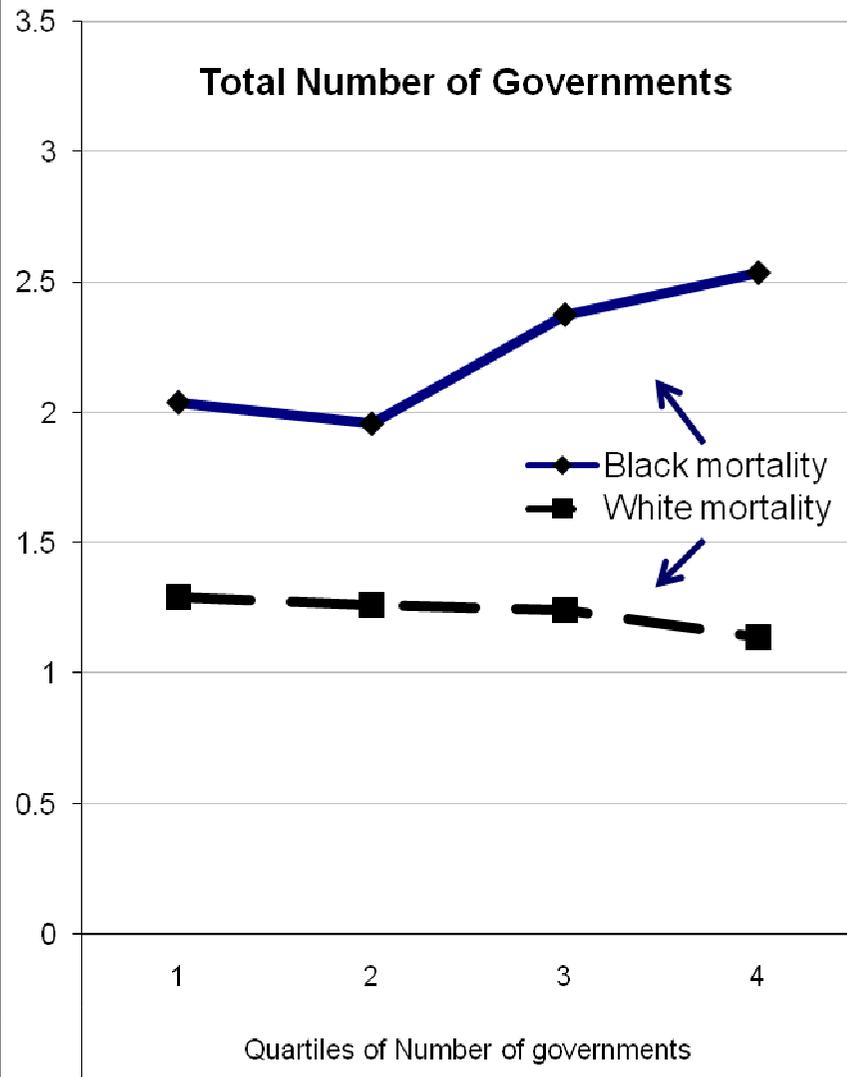
Modified from Myron Orfield

TABLE 7-2. Geopolitical Fragmentation in the 25 Largest Metropolitan Areas

<i>Metropolitan area</i>	<i>Total local governments</i>	<i>Population living in central city (%)</i>	<i>Geopolitical fragmentation index</i>
Pittsburgh	418	14.8	12.0
St. Louis	312	13.8	8.8
Cincinnati	235	18.0	6.7
Minneapolis–St. Paul	344	22.4	5.5
Cleveland	267	17.1	5.4
Boston	296	9.6	5.3
Detroit	335	18.4	3.3
Kansas City	182	34.6	3.1
Atlanta	127	11.4	3.1
Philadelphia	442	24.7	3.0
Chicago	567	31.7	2.1
Milwaukee	113	36.1	1.9
Dallas	196	23.1	1.8
Portland	87	23.2	1.8
Seattle	94	15.9	1.8
Miami	57	10.5	1.5
San Francisco	114	11.1	1.5
Denver	74	21.9	1.5
Tampa	39	13.0	1.4
Washington, D.C.	158	17.1	1.3
New York	756	37.3	1.0
Houston	123	41.1	0.7
Los Angeles	182	23.0	0.5
Phoenix	34	42.1	0.3
San Diego	19	43.7	0.2

Source: U.S. Census Bureau.

Age-adjusted mortality by government fragmentation quartiles 1996-1998, 171 US Metropolitan areas with populations >250,000



Macro-level structural factors operating in the US since World War II have contributed to the inequitable development that currently exists along racial and class lines within the United States. The presence of numerous governmental jurisdictions in large metropolitan areas in the United States can lead to competition with each other for resources and can result in the differential distribution of risks and resources, thereby shaping the geography of opportunity with adverse consequences for health.

Our results suggest that this fragmentation of local jurisdictions in metropolitan areas in the US provides a playing field for the differential endowment of the areas in which people live, thereby seeding spatial inequality in health. It may be one of the mechanisms that translates racial and economic spatial segregation into inequalities in health.

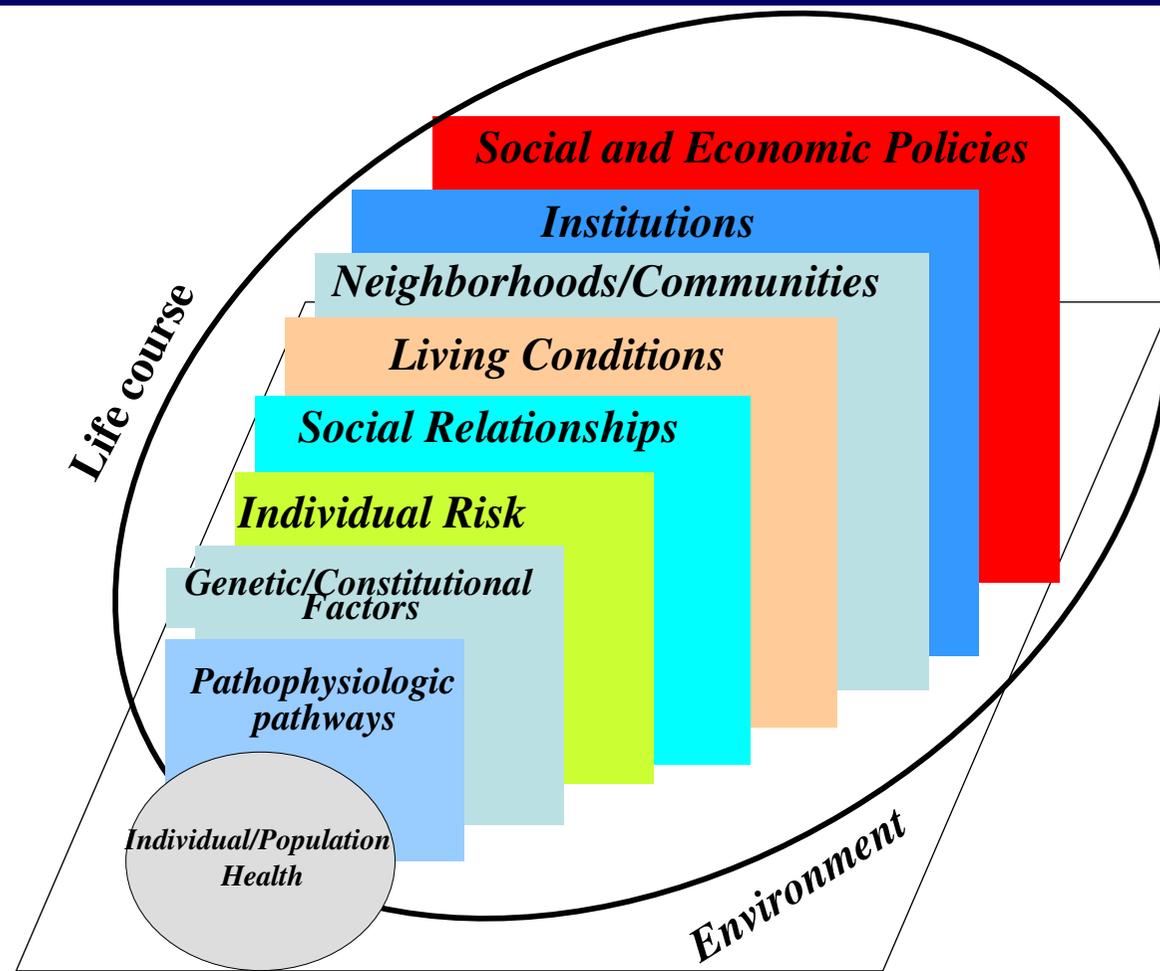
But, in the absence of data that allows us to observe the dynamic flow of people and resources as metropolitan areas develop and change, and on the impact of these changes on the everyday lives of residents of these areas, we are left speculate on the precise pathways by which inequalities in health are generated.

A common feature of these examples is a lack of critical data that would help inform our analyses— in many respects this is no different than in other areas of epidemiology.

However, there are additional challenges posed by the broadened view of social epidemiology that I am proposing:

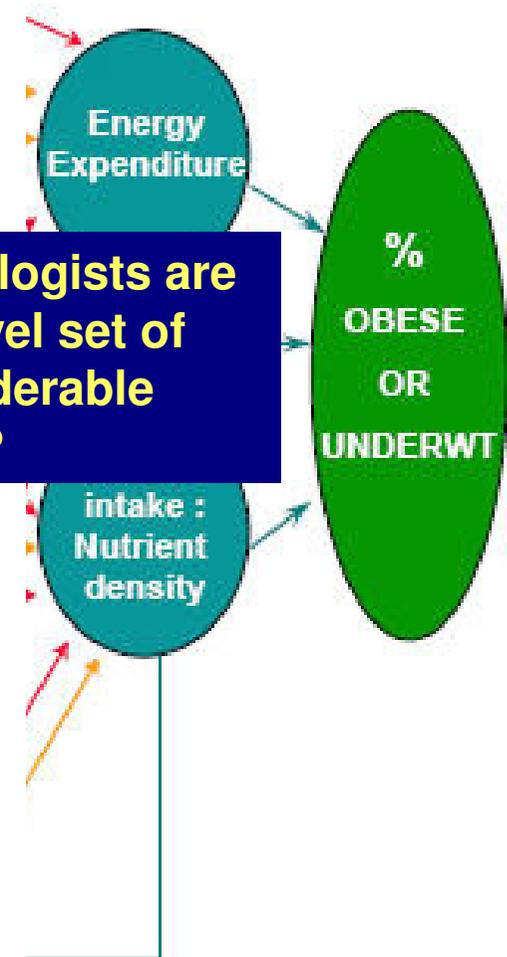
- 1) Need to build bridges to other disciplines that often don't see their relevance to issues of health (planning, education, zoning, etc.)
 - 2) Need to conduct active surveillance for social, political, and policy changes where we might expect health effects (e.g. welfare reform)
 - 3) Need to have studies that allow us to understand how these changes impact on the everyday lives and proximal risk factors of residents of individuals and groups
- 1) Need to lobby for the collection of such data

In the minute or two I have left, let me also point to a major analytic challenges that we have as social epidemiologists trying to understand population health and health disparities. I will suggest that we need to move away from our “obsession” with estimating “independent” effects.



(Kaplan, 1998)

INDIVIDUAL



What regression models used by epidemiologists are capable of capturing this dynamic, multilevel set of relationships that undoubtedly have considerable non-linearity, feed-back, and feed-forward?

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Recent work on Complex Systems Approaches from the Center for Social Epidemiology and Population Health

Koopman JS, Lynch JW. Individual causal models and population systems models in epidemiology. Am J Pub Health 1999; 89: 1170-1174.

Kaplan GA. Searching for Simplicity in a Complex World, or Are there are more things in heaven and earth, Horatio, than are dreamt of in our epidemiology? SER Presidential address (June 2004)

Diez Roux AV. Integrating social and biological factors in health research: a systems view. Annals of Epidemiology 2007;17:569-74

Galea S, Kaplan GA. Complex system approaches. Causal thinking, and epidemiologic inquiry; submitted, 2008

Auchincloss AH, Diez Roux AV. A new tool for epidemiology? The usefulness of dynamic agent models in understanding place effects on health. Am J Epidemiol 2008; 168: 1-8.

Galea S, Hall CJ, Kaplan GA. Social epidemiology and complex system dynamic modeling as applied to health behaviour and drug use research. Int J Drug Policy 2008; in press.

Some might argue that epidemiologists should have no part in explicating these complex patterns that range from political and social events to complex regulatory processes under the skin.

However, if social epidemiology is to live up to its promise of linking social and biological processes, I would submit that we have no choice but to do so.

A movement towards complex systems modeling and the simulation approaches that it entails means a turn away from the practice of estimating independent effects to an empirically-based construction of “what-if” scenarios.

This represents a major change in the culture of epidemiology, embracing complexity rather than trying to get rid of it. Focusing on evidence-based simulation rather than using our conventional regression-based techniques.

It is a complex task..... Is it too complex?

Einstein's Brain

“Everything should be as simple as it is, but not simpler”

Attributed to A. Einstein

