Abstracted Empiricism in Social Epidemiology

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Introduction

In 1959 C. Wright Mills, professor of sociology at Columbia University, wrote a book, *The Sociological Imagination*, critical of the then dominant trends in his field.[1] He was particularly critical of what he called Grand Theorists and Abstracted Empiricists. Abstracted Empiricism was the label Mills applied to survey research on public opinion, in which individuals were sampled, their responses coded onto Hollerith cards (the predecessor of more sophisticated electronic coding) "which were then used to make statistical runs by means of which relations are sought. Undoubtedly this fact, and the consequent ease with which the procedure is learned by any fairly intelligent person, accounts for much of its appeal."[2]

According to Mills, because of its focus on individuals, studies of voting behavior, for example, did not consider "party machinery for 'getting out the vote'", nor did studies of social stratification give any consideration to class consciousness or false consciousness but relied instead on "spongy indices of socio-economic status."[3] This reflected a pervasive "psychologism," which Mills defined broadly as "the attempt to explain social phenomena in terms of facts and theories about the make-up of individuals."

> Historically, as a doctrine, it rests upon an explicit metaphysical denial of the reality of social structure. At other times, its adherents may set forth a conception of structure which reduces it, so far as explanations are concerned, to a set of milieux. In a still more general way…pyschologism rests upon the idea that if we study a series of individuals and their milieux, the results of our studies in some way can be added up to knowledge of social structure.[4]

Abstracted Empiricists embraced a philosophy based upon what they considered natural science, emphasizing, according to Mills, the significance of Method over

1 C. Wright Mills, *The Sociological Imagination* (New York, 1959).
2 Mills, *ibid.*, p. 50.
3 Mills, *ibid.*, p. 54.
4 Mills, *ibid.*, p. 67, fn. 12.

substance. It was, he continued, "systematically a-historical and non-comparative."[5] And because the method of choice was quantitative survey research, which was said to be more scientific than other types of social inquiry, large teams, budgets, and institutes were required, leading to the bureaucratization of scholarship and transforming it from a craft to an industrial process.

This new process had profound implications, for the researcher was distanced from his or her subjects. Mills observed "[O]ne reason for the thin formality or even emptiness of these fact-cluttered studies is that they contain very little or no direct observation by those who are in charge of them. The 'empirical facts' are facts collected by a bureaucratically guided set of usually semi-skilled individuals. It has been forgotten that social observation requires high skill and acute sensibility; that discovery often occurs precisely when an imaginative mind sets itself down in the middle of social realities."[6] The same remoteness pertains, perhaps even more so, with secondary analyses of existing data.

Survey research was not invented in the 1950s when Mills was writing. Its origins go back to at least the late 19th century. It grew explosively in the post-World War II period,[7] however, including in the domain of health-related research in the United States. It became incorporated into studies of health care utilization as well as epidemiological studies of morbidity and health, both physical and psychiatric, sponsored by on-going national surveys like the National Health Interview Survey and the Behavioral Risk Factor Surveillance System carried out by agencies of the federal government, and by large grants for such projects as the Epidemiological Catchment Area study, a nation-wide study of the distribution of mental disorders among Americans sponsored by the National Institute of Mental Health.

Like the industrial production of cars and washing machines, there are distinct advantages to this transition from a craft mode of production to one that is more bureaucratically organized. Large surveys can provide a snapshot of attitudes and of the prevalence of various conditions and their distribution in the population in a way no single investigator can; when repeated over a period of years, they may give useful information on temporal trends; and of course they do not preclude the use of other methods as well. Mills thought, however, that too often they were the only method of choice, and that implied distinct disadvantages, particularly that the information produced tended to be a-historical and de-contextualized. My argument is that it is when such data, including census information, vital statistics, and self-reported health, are put into their social, historical and comparative context that they are truly illuminating. I illustrate with an example from social epidemiology.

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5 Mills, *ibid.*, p. 68.

6 Mills, *ibid.*, p. 70, fn. 13.

7 Susan E. Igo, *The Averaged American: Surveys, Citizens, and the Making of a Mass Public* (Cambridge 2007).

Income Inequality and Mortality in the United States

An association between life expectancy and mortality on the one hand and income inequality on the other has been observed since the 1970s.[8] Since then, studies have proliferated, and recently several reviews have appeared which tend to reach different conclusions about the pervasiveness and reality of the association, and the causal nature of the association when one is observed.[9] One of the most robust effects upon which virtually all agree, however, has been observed among the 50 states of the United States, where the association between income inequality and mortality has often been found to be strongly positive: the greater the inequality, the worse the health outcome, whether it is some measure of mortality or self-assessed health status.[10] The association is of relatively recent vintage, however, since there was no association between inequality and mortality from 1949 until 1979.[11] Since then there has been a significant association, though one that has varied in strength. As Lynch et al have noted, most studies of the association have been done in the 1990s with no evident awareness of just how recent the pattern is.

Likewise, virtually none of the analyses of the association between income inequality and mortality take into account Galton's Problem, which has bedeviled comparative social research since the late 19th century.[12] At a conference in 1889 the anthropologist Edward Tylor presented data on cultural traits from several hundred societies as part of an argument for cultural evolution. Francis Galton raised the question of whether these several hundred societies were truly independent of one another or whether many of the traits were shared. "It was extremely desirable," he said, "…that full information should be given as to the degree in which the customs of the tribes and races which are compared together are independent. It might be, that some of the tribes had derived them from a common source, so that they were

8 G. B. Rogers, "Income and inequality as determinants of mortality: an international cross-section analysis", *Population Studies*, 33 (1979), 343–350. S. Preston, *Mortality Patterns in National Populations* (New York 1976).

9 John Lynch, G.D. Smith, S. Harper, M. Hillemeier, N. Ross, G.A. Kalan, and M. Wolfson. (2004). "Is income inequality a determinant of population health? Part 1. A systematic review", *The Milbank Quarterly*, 82 (2004), 5–99. Richard G. Wilkinson, and K. E. Pickett, "Income inequality and population health: A review and explanation of the evidence", *Social Science and Medicine* 62 (2006), 1768–1784.

10 S. V. Subramanian and I. Kawachi, "Income inequality and health: what have we learned so far?", *Epidemiologic Reviews*, 26 (2004), 79–91.

11 John Lynch, S. Harper, G. A. Kaplan, G. D. Smith, "Associations between income inequality and mortality among US states: the importance of time period and source of income data", *American Journal of Public Health,* 95 (2005), 1424–1430.

12 Joseph G. Jorgensen, "Cross Cultural Comparisons", *Annual Reviews of Anthropology*, 8 (1979), 309–331.

duplicate copies of the same original."[13] Their potential lack of independence raised serious questions about Tylor's theory, and since then the question of independence versus diffusion has pre-occupied many anthropologists doing comparative research. The issue is no less real, though much less of a preoccupation, for epidemiologists studying the association between income inequality and health.

One way to deal with some of the issues raised by Galton's Problem is by considering spatial effects, notably spatial trend and spatial autocorrelation. Spatial autocorrelation occurs when adjacent spatial units, such as adjacent counties or adjacent states, exhibit similar values and appears as a correlation of values within a single variable that is due purely to location.[14] That is, when the values of a variable are placed into some specified geographic units, such as states within a country, high values may tend to cluster together spatially, and low values may tend to cluster together spatially. This would be an example of positive spatial autocorrelation and results in confounding when such correlations remain unaccounted for in analyses.

Spatial trend results when the mean is not constant across the study area.[15] An example would be if Gini coefficients tend to increase from small values to large values in an east to west direction. Spatial trend is important to take into account because its presence in data can lead the residuals of a regression model, for instance, not to be independent of one another, violating the independence assumption of such models. Spatial autocorrelation indicates a local effect whereas spatial trend is more global in nature.[16]

Analyses of income inequality and mortality using data from U.S. states in 2000 showed that when spatial autocorrelation was taken into account, the association between inequality and mortality weakened but did not disappear.[17] In the following analyses, spatial trend is used to assess the same association.

Changing Income, Inequality, Education and Mortality among the Contiguous 48 States

This paper uses spatial trend, measured as the latitude and longitude of the capitals of the 48 contiguous states, to consider the changing associations among median household income, income inequality, education, and age adjusted mortality rates

13 Galton's comments appear in Edward B. Tylor, "On a method of investigating the development of institutions; applied to laws of marriage and descent", *The Journal of the Anthropological Institute of Great Britain and Ireland*, 18 (1889), p. 270.

14 D. A. Griffith, *Advanced Spatial Statistics* (Boston 1988).

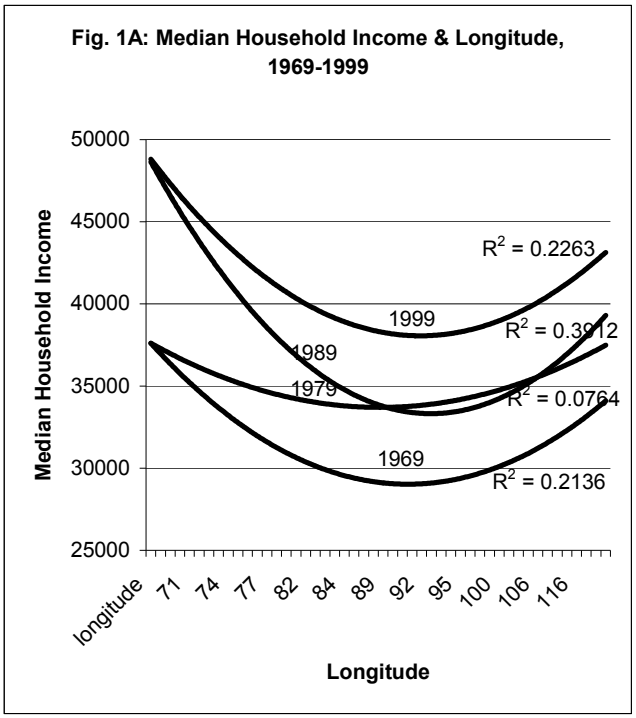
15 R. Haining, *Spatial Data Analysis: Theory and Practice* (Cambridge 2004).

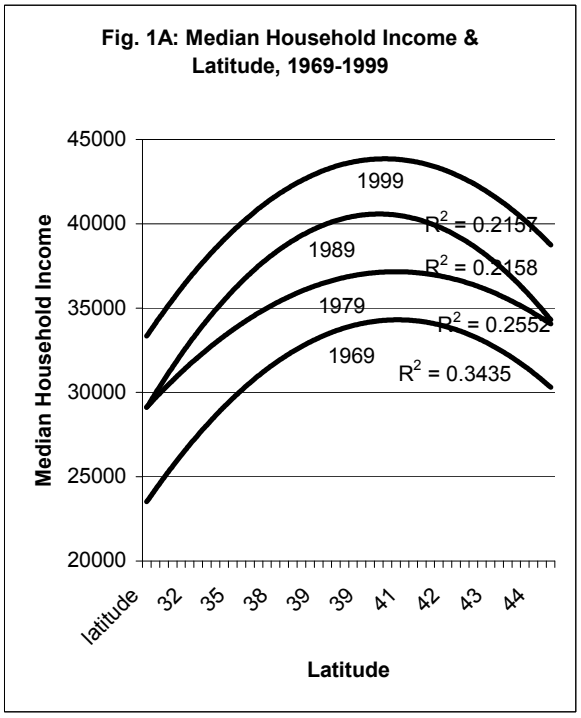
16 Larry J. Layne, personal communication.

17 Larry J. Layne, "Spatial autocorrelation" pp. 200–211 in S. J. Kunitz, *The Health of Populations: General Theories and Particular Realities* (New York 2006).

in different years. Figure 1, Panel A displays the results of regressions of median household income onto both latitude and longitude in each decade from 1969 through 1999 (in constant 1999 dollars). In each year the association between latitude and income is an inverted J. Lowest income is in the South (the lowest latitudes), but a few of the most northern states – North and South Dakota, Montana, Maine, and Vermont – also had low income. The association with longitude is U-shaped: higher income on the two coasts (the lowest and highest longitudes) than in the mid-section of the country. In 1979 the East-West difference disappeared as income in the mid-section of the country grew more rapidly than on the coasts. The coastal advantage reappeared after 1979, however, though it weakened slightly between 1989 and 1999. In each of those years, income was higher in the East than the West.

Figure 1. Income, Gini Coefficient, Education, and Mortality Regressed onto Latitude and Longitude.





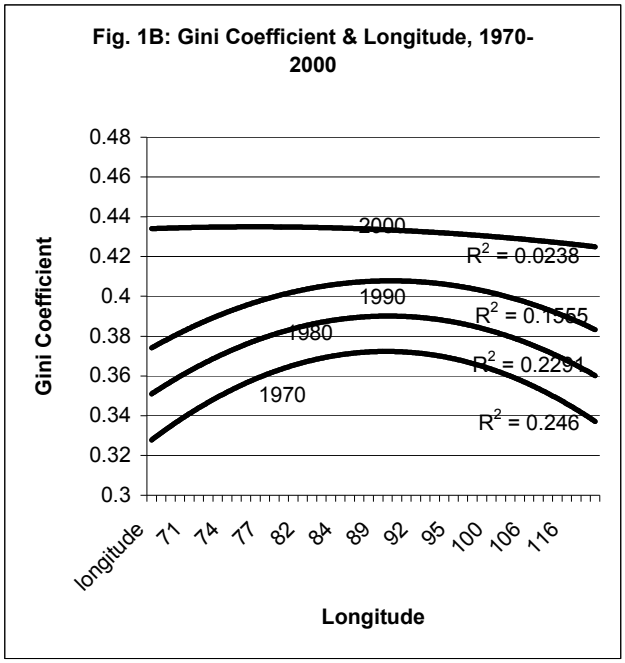


Fig. 1B: Gini Coefficient & Longitude, 1970-2000
Gini Coefficient
0.48
0.46
0.44
0.42
0.4
0.38
0.36
0.34
0.32
0.3
2000
R^2 = 0.0238
1990
R^2 = 0.1555
1980
R^2 = 0.2291
1970
R^2 = 0.246
longitude 71 74 77 82 84 89 92 95 100 106 116
Longitude

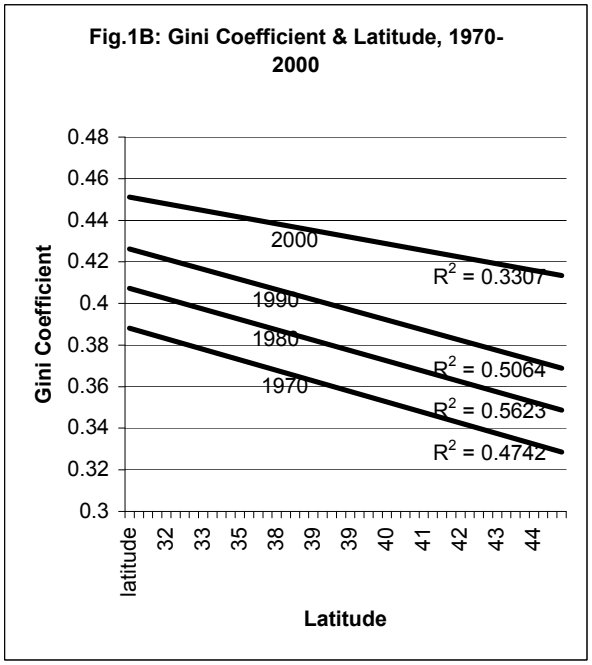


Fig.1B: Gini Coefficient & Latitude, 1970-2000
Gini Coefficient
0.48
0.46
0.44
0.42
0.4
0.38
0.36
0.34
0.32
0.3
2000
R^2 = 0.3307
1990
R^2 = 0.5064
1980
R^2 = 0.5623
1970
R^2 = 0.4742
latitude 32 33 35 38 39 39 40 41 42 43 44
Latitude

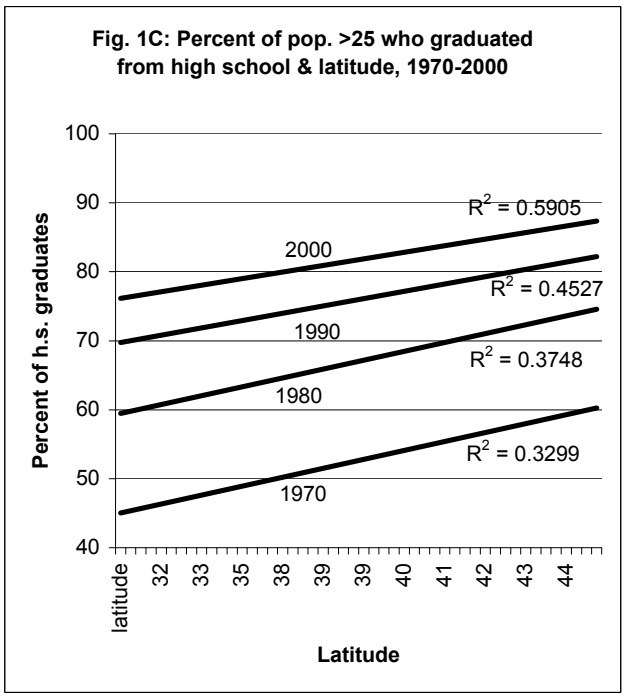


Fig. 1C: Percent of pop. >25 who graduated from high school & latitude, 1970-2000
Percent of h.s. graduates
100
90
80
70
60
50
40
R^2 = 0.5905
2000
R^2 = 0.4527
1990
R^2 = 0.3748
1980
R^2 = 0.3299
1970
latitude 32 33 35 38 39 39 40 41 42 43 44
Latitude

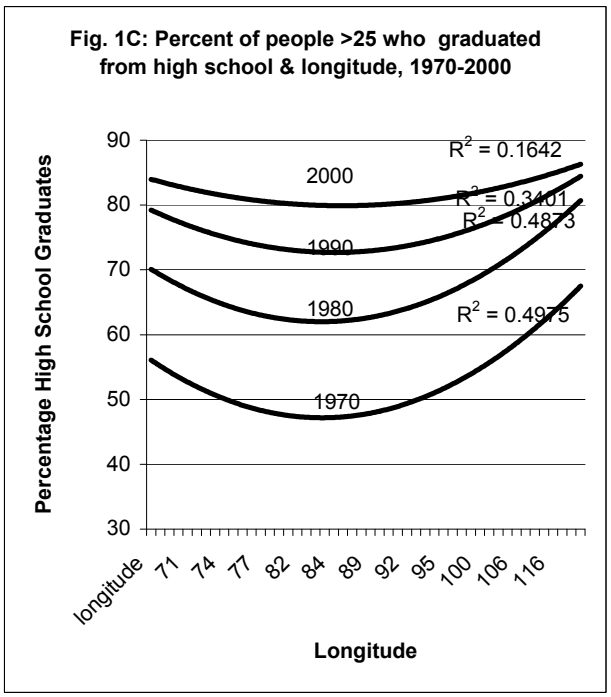
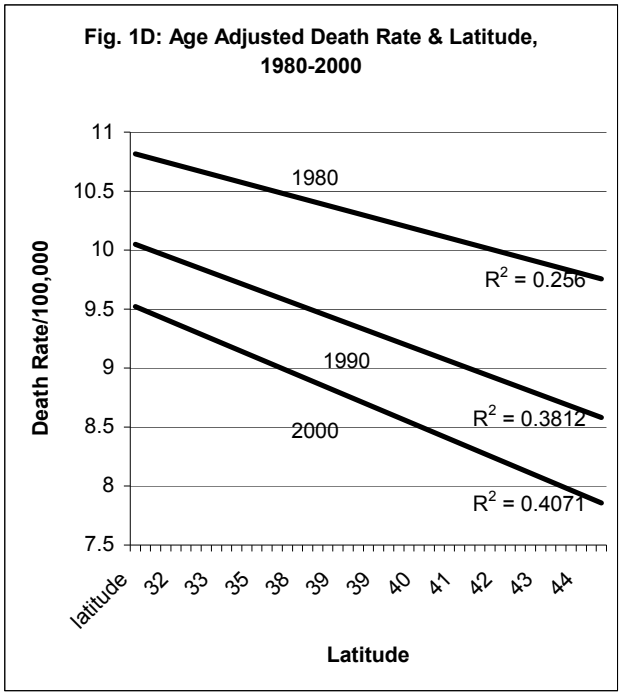
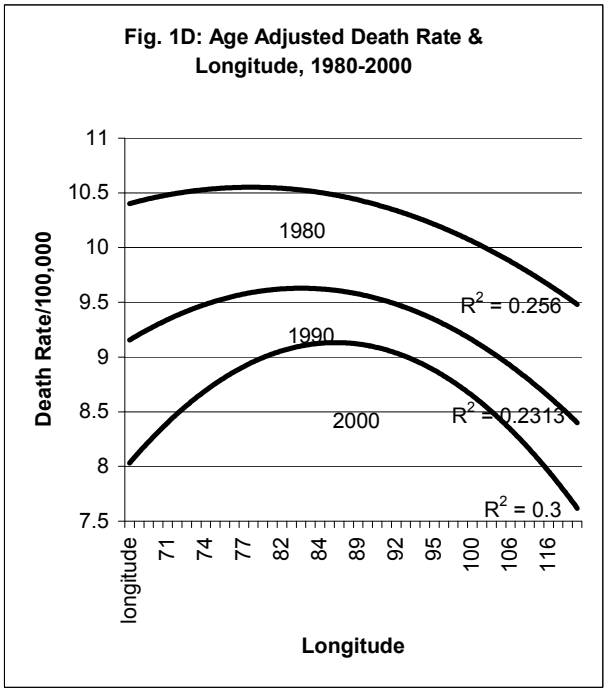


Fig. 1C: Percent of people >25 who graduated from high school & longitude, 1970-2000
Percentage High School Graduates
90
80
70
60
50
40
30
R^2 = 0.1642
2000
R^2 = 0.3401
R^2 = 0.4873
1990
1980
R^2 = 0.4975
1970
longitude 71 74 77 82 84 89 92 95 100 106 116
Longitude





Sources. A. Income Surveys Branch/HHES Division, U.S. Census Bureau, U.S. Department of Commerce, U.S. Censuses of Population 1970, 1980, 1990, and 2000, Table S1: Median Household Income by State: 1969, 1979, 1989, and 1999: www.census.gov/hhes/www/income/histinc/state/state.
B. 1970, 1980, and 1990: R. Morrill, "Geographic variation in change in income inequality among US states, 1970–1990." *The Annals of Regional Science*, 34: 109–130, 2000. 2000: L. J. Layne and S. J. Kunitz, "Spatial effects on the association income and mortality." Submitted.
C. Census 2000 PHC-T-41. A Half-Century of Learning. Historical Statistics on Educational Attainment in the United States, 1940 to 2000. U.S. Census Bureau, U.S. Department of Commerce, U.S. Censuses of the Population, 1940, 1950, 1960, 1970, 1980, 1990, and 2000.
D. CDC, http://wonder.cdc.gov/mortSQL.html.

Panel B of Figure 1 displays similar analyses of the Gini coefficient regressed onto both latitude and longitude. As is the case with median household income, latitude and the Gini coefficient are most consistently associated: the lower (the further south) the latitude, the greater is the income inequality, though the relationship has weakened from 1980 to 2000 as inequality increased more rapidly in the North than the South. The association with longitude is more complicated. In 1970 states in the East (the lowest longitudes) and in the West (the highest longitudes) had the lowest income inequality. The shape of the curve was an inverted U. Over succeeding decades the curve flattened as inequality on the east and west coasts increased more rapidly than in the mid-section of the country. Thus in the past two decades both income and income inequality have grown most on the coasts and least in the middle of the country, though income continues to be highest in the North and on both coasts as well.

Panel C of Figure 1 displays the results of regressions of the proportion of people 25 years of age and above in each state who have a high school or higher education. Once again there is a persistent significant North-South difference. Though educational attainment has increased everywhere, it continues to be higher in the North. On the other hand, the East-West difference that was pronounced at mid-century has disappeared as educational attainment in the mid-section of the country has caught up with that of the two coasts.

Finally, Panel D of Figure 1 displays similar analyses of age-adjusted death rates in 1980, 1990, and 2000 (adjusted to the 2000 standard population). In 1980 mortality was highest in the South and lowest in the West. By 2000 mortality had declined nationwide, more rapidly in the North than in the South. The East-West difference, which had been significant in 1980 due to low death rates in the West, became more pronounced by 2000 as mortality declined especially rapidly in the East. These patterns of change are displayed graphically in Figure 2, in which percentage changes in inequality and mortality are regressed onto latitude and longitude.

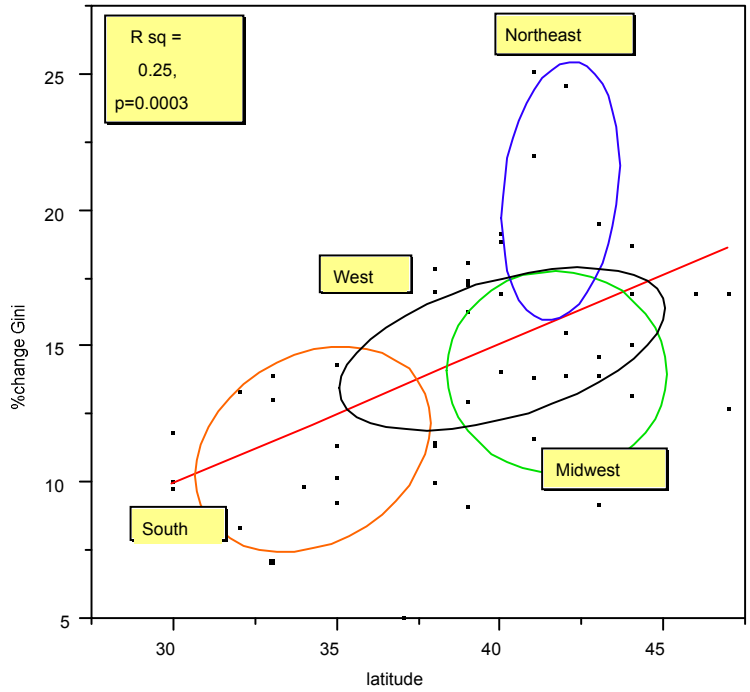
Panel A of Figure 2 shows that proportionate change in income inequality from 1980 to 2000 was greatest in the North and lowest in the South. Panel B, in which change in Gini is regressed onto longitude, shows a reverse J-shaped curve with change greatest in the Northeast. Thus both income and income inequality grew most rapidly in the Northeast though inequality remained highest in the South.
Panel C of Figure 2 shows that mortality declined most rapidly in the North and least rapidly in the South. Panel D shows that mortality declined most rapidly on the East and West Coasts, especially in the Northeast, and least rapidly in the mid-section of the country. When these patterns are combined, the results indicate that mortality decline was greatest where inequality grew the most (R^2=0.2516, p=0.0003), and that this was in the Northeast of the country, thus confirming results reported previously by Lynch et al[18] using somewhat different analyses. Change in each variable was least in the South.

Another way to examine the importance of region is to regress mortality onto the Gini coefficient as well as onto latitude and longitude as is done in Table 1 (page 17). Once spatial dimensions are included in the analyses using state level data from 2000, the significance of the Gini coefficient disappears. The same regional effect is not evident for income, which remains significantly inversely associated with mortality even when latitude and longitude are included in the analyses.

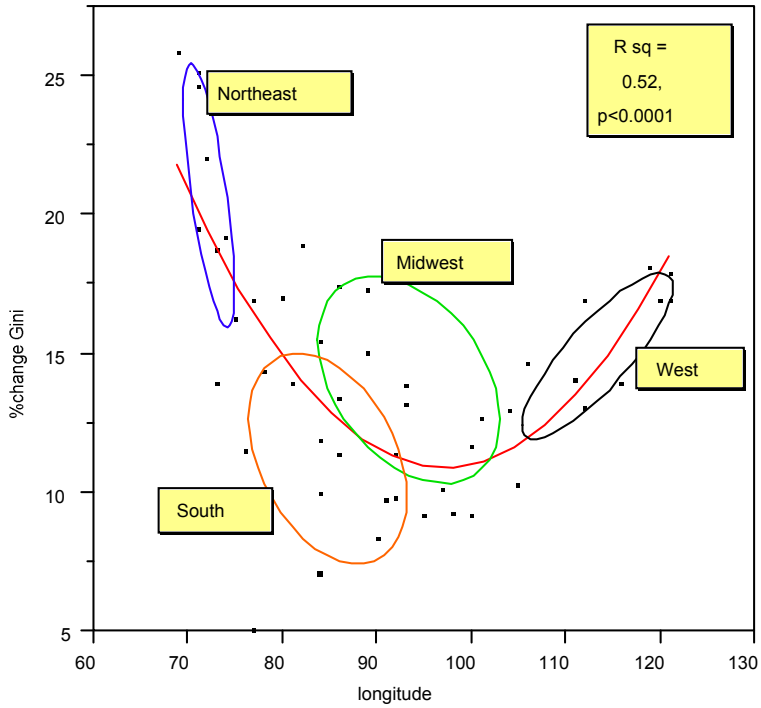
18 John Lynch, G.D. Smith, S. Harper, and M. Hillemeier, "Is income inequality a determinant of population health? Part 2. U.S. national and regional trends in income inequality and age- and cause-specific mortality", *The Milbank Quarterly*, 82 (2004), 355–400.

Figure 2. Change in Gini Coefficient and Change in Age Adjusted Death Rate, 1980–2000, Each Regressed onto Latitude and Longitude, 48 Contiguous U.S. States

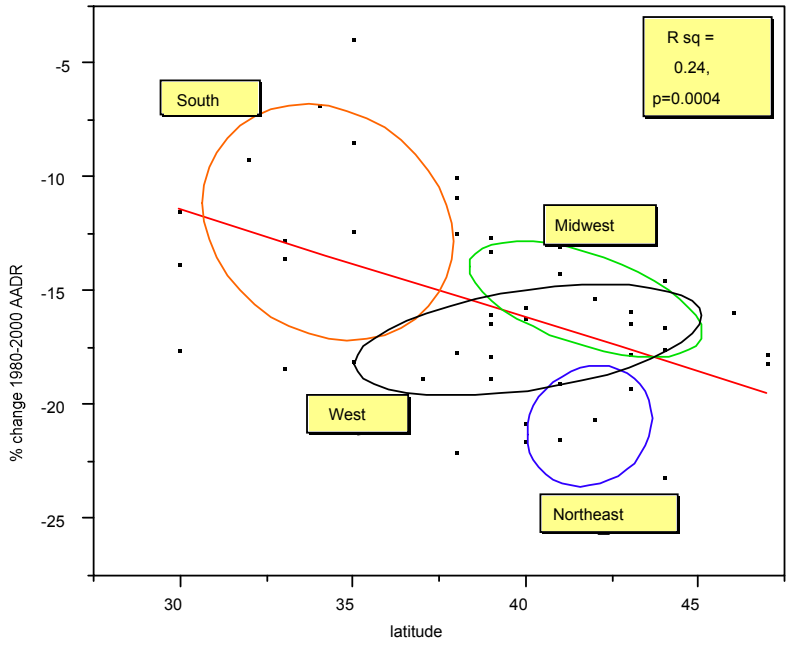
A. Change in Gini 1980–2000 regressed onto latitude.



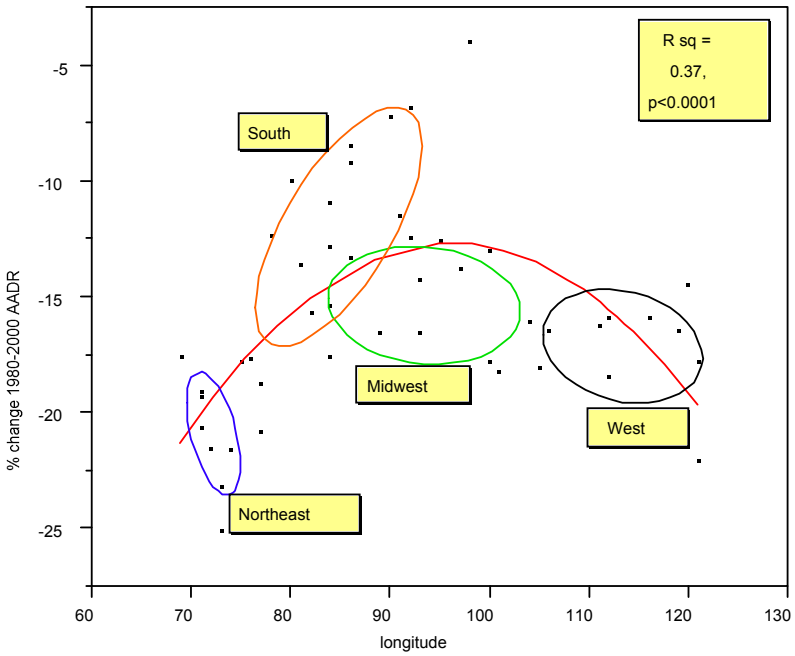
B. Change in Gini 1980–2000 regressed onto longitude.



C. Change in age adjusted death rate 1980–2000, regressed onto latitude.



D. Change in age adjusted death rate 1980–2000, regressed onto longitude.



Sources. A: calculated from Morrill, R., "Geographic variations in change in income inequality among US states, 1970–1990", *Annals of Regional Science* 34:1 (2000), 109–130. Gini Coefficients 2000, Layne, L. J. pp. 200–211 in S. J. Kunitz, *The Health of Populations: General Theories and Particular Realities* (New York, 2006).
B: CDC Wonder, Compressed Mortality File: http://wonder.cdc.gov/mortSQL.html. Accessed September, 2007.

Table 1. Age-Adjusted Mortality Rate, 48 Contiguous States, 2000, Regressed onto Gini Coefficient, Income, Latitude, and Longitude.

	Estimate	Standard Error	t-ratio	p
A. Gini Coefficient.*				
Intercept	0.9120	2.2596	0.40	0.6881
Gini	17.9510	5.2219	3.44	0.0013
B. Gini, latitude & longitude.*				
Intercept	24.5616	6.7482	3.64	0.0007
Gini	4.7664	5.4910	0.87	0.3902
Latitude	-0.4285	0.1473	-2.91	0.0057
Longitude	-0.1552	0.0637	-2.44	0.0191
Latitude* Longitude	0.0036	0.0015	2.34	0.0242
C. Median household income. **				
Intercept	11.3466	0.6587	17.23	<0.0001
Income	-0.00006	0.00001	-4.10	0.0002
D. Income, latitude & longitude				
Intercept	25.9314	5.2335	4.95	<0.0001
Income	-0.00005	0.00001	-3.77	0.0005
Latitude	-0.3488	0.1302	-2.68	0.0105
Longitude	-0.1299	0.0560	-2.31	0.0255
Latitude* Longitude	0.0028	0.0013	2.10	0.0418

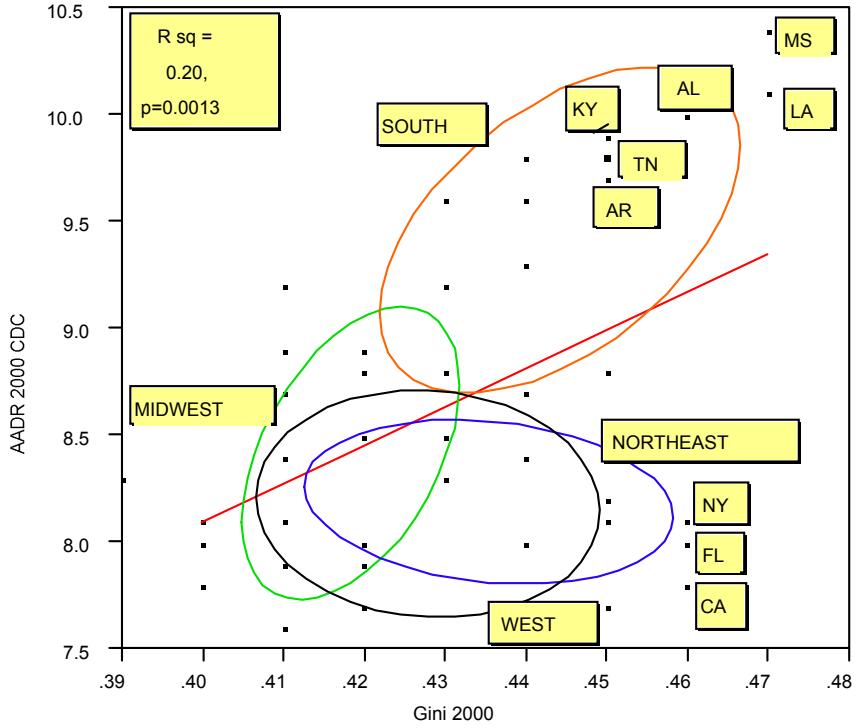
* Results are very similar using 1980 and 1990 data.

** In 1980 and 1990 there is no association between median household income and mortality.

To consider these contemporary patterns further, Figure 3 displays a simple regression of Age-Adjusted Mortality onto the Gini coefficient using data from 2000. The association is significant, as expected, but it is driven entirely by the South. When this region is excluded from the analysis, there is no association between inequality and mortality in the remaining states (R^2 = 0.000005), even though the range of inequality is still substantial.

Consider the five Deep South states. In Table 2 (page 18) Georgia, South Carolina, Alabama, Mississippi, and Louisiana are compared to four adjacent northeastern states: New York, Connecticut, Rhode Island, and Massachusetts. Notice that average Gini coefficient is the same but that everything else is different. Income is substantially higher in the Northeast, and age-adjusted mortality, infant mortality, and homicide rates are all lower than in the Deep South.

Figure 3. Age Adjusted Death Rate Regressed onto Gini Coefficient, 48 Contiguous States, 2000, with 50% Density Ellipses for each Region of the Country.



Sources. Compressed Mortality File: http://wonder.cdc.gov/mortSQL.html. Accessed September, 2007, and Layne, L .J. pp. 2000–211 in S. J. Kunitz, *The Health of Populations: General Theories and Particular Realities* (New York, 2006).

Table 2. Comparison of Income and Health in Two Regions of the U.S., 2000.

Dependent Variables	**Deep South (N=5)* Average**	**Northeast (N=4)** Average**
Gini Coefficient	0.45	0.45
Average Household Income	$47,579	$64,357
Age Adjusted Death Rate/ 100,000	999.6	805.7
Homicide Rate/100,000	13.8	8.4
Infant Mortality Rate/ 1,000 live births	9.34	5.82

* South Carolina, Georgia, Mississippi, Alabama, & Louisiana

** New York, Connecticut, Rhode Island, & Massachusetts.

That income is inversely associated with mortality in 2000 (R^2=0.27, p=0.0002) is consistent with the conventional wisdom, but the story is as complicated as the one about the association between inequality and mortality, for there was no association

between median household income and mortality in either 1980 (R^2=0.02, p=0.3064) or 1990 (R^2=0.03, p=0.2088). Income is highly correlated among all three years, but it grew more rapidly in the Northeast than elsewhere over the 20-year period. Over the same period, as already shown, mortality declined more rapidly in the Northeast than elsewhere in the country. Indeed, the association between change in income and change in mortality is significant (R^2 = 0.10, p= 0.0221), accounted for entirely by changes in the Northeast. When this region of the country is excluded from the analysis, the association is no longer significant (R^2=0.0121, p=0.5042). Thus, like income inequality, income has an inconsistent association with mortality, one that is largely shaped by changes in regional economies and mortality patterns that are evidently independent of one another.

Education has increased steadily across the country without reversals but at different rates, as the analyses described above have indicated. Unlike the income variables, education is inversely associated with mortality in each year, even taking latitude and longitude into account. Table 3 displays the regression using 2000 data, but the results using data from 1980 and 1990 are very similar. Latitude and longitude are significant but add little to the explained variance. If census region or census division are substituted for latitude and longitude, R2 increases, to 0.64 and

Table 3. Mortality Regressed onto Education,* Latitude, and Longitude, 48 Contiguous U.S. States, 2000.

Independent Variables	Estimate	Std. Error	t-ratio	p
A. Education alone				
Intercept	19.1907	1.5034	12.76	<0.0001
Education	-0.1286	0.0183	-7.01	<0.0001
R^2: 0.5161				
B. Education with latitude & longitude				
Intercept	30.1849	5.3680	5.62	<0.0001
Latitude	-0.3214	0.1344	-2.39	0.0212
Longitude	-0.1318	0.0570	-2.31	0.0254
Latitude*Longitude	0.0031	0.0013	2.24	0.0301
Education	-0.0983	0.0278	-3.53	0.0010
R^2: 0.5809				

* Proportion of people 25 years of age and above who graduated from high school or above.

0.69 respectively, but education retains its overwhelming importance. Thus education has an association with mortality that is not simply a proxy for regional effects but that is significant in itself.

Discussion

These analyses suggest several related points. First, fluctuations in state and regional economies are not tied in any intimate way to changes in mortality. This is very likely due to the fact that under an epidemiologic regime characterized by chronic conditions or endemic infectious diseases, influences on health over the entire life course may be more significant than socioeconomic influences in the year of death, or even in the few years prior to death, (though de-trending may reveal fluctuation in particular causes of death correlated with fluctuations in the business cycle[19]). The situation is likely to be very different under extreme conditions of poverty, famine, and epidemics or pandemics of infectious diseases, when fluctuations in the economy may translate very directly into fluctuations in mortality.[20]

Second, and most significant for present purposes, virtually every analysis of the association between income inequality and mortality or some other health-related measure assumes that the units of analyses are independent of one another and ignores the possibility of diffusion from a common source. But states tend to be like their neighbors precisely because so often they derive their political cultures from a common source, and therefore for some purposes regions may be more appropriate units of analysis, though how states are grouped may be a contentious matter.[21] Specifically in respect of the association between income inequality and mortality, regional differences are particularly important, for when the association is significant, it is driven by the South. A highly unequal region like the Northeast has much lower mortality, illustrating the importance of the historical and social context in which inequality occurs. This is not unprecedented. A similar pattern was observed in a study of fertility in Spain, in which regions rather than the provinces within regions appeared to be the more appropriate units of analysis.[22]

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19 M. Harvey Brenner, "Mortality and economic instability: detailed analyses for Britain and comparative analyses for selected industrialized countries", *International Journal of Health Services,* 13 (1983), 563–620.

20 E. A. Wrigley and R. S. Schofield, *The Population History of England 1541–1871: A Reconstruction* (London 1981), p. 399. Stephen J. Kunitz and S. Engerman, "The ranks of death: secular trends in income and mortality", *The Health Transition Review*, 2 (supplement 1992): 29–46.

21 R. D. Gastil, *Cultural Regions of the United States* (Seattle 1975).

22 T. W. Leasure, "Factors involved in the decline of fertility in Spain 1900–1950", *Population Studies*, 16 (1963), 271–285.

Education, however, acts differently from both income and income inequality. It is a useful example both of the importance of the similarity of neighboring states that share a history and a culture[23] and of the significance of the association even taking these similarities into account. In the United States education is primarily a local and state concern, but states within the same region are similar in their commitments. Thus educational attainment has historically been lower in the South than in the North,[24] and that continues to be the case at present. A large part of the explanation has to do with the resistance of white elites to the acquisition of literacy by their slaves, a pattern also found in other plantation economies of the western hemisphere, and one that persisted after the abolition of slavery.[25] And although the Appalachian highlands were not conducive to plantations, and had few slaves in the past and few African Americans at present, they were a source of natural resources, especially coal and lumber,[26] which were controlled by local elites in cooperation with external sources of capital. As in the southern lowlands, so too in the mountains, state governments adhered to a low taxation regime and economy in government,[27] thus perpetuating inadequate support for schools and low educational attainment.[28]

But the situation was more complex than that, for McWhiney has argued that another part of the explanation has to do with the low value placed on education by immigrants to the Appalachian highlands from the border country of northern England and Scotland and from northern Ireland.[29] Theirs was an oral culture in contrast to that of the Puritans from the Southeast of England who settled in New England, who valued literacy and who required children to attend school. As settlement moved west in the 19th century, Yankees established small colleges in communities across the northern Midwest, many of which persist as private liberal arts colleges to the present day. Nothing comparable occurred as Southerners moved west across the southern tier of states.[30]

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23 R. D. Gastil, *op. cit.*, pp. 116–127.

24 Douglass C. North, *The Economic Growth of the United States 1790–1860* (New York 1966), pp. 133, 153, and 174.

25 Stanley L. Engerman, and K. L. Sokoloff, *Factor Endowments, Inequality, and Paths of Development among New World Economies*. Working paper 9259, National Bureau of Economic Research (Cambridge 2002).

26 Harold A. Gibbard, H. A. (1962). "Extractive industries and forestry" In T.R. Ford, ed. *The Southern Appalachian Region: A Survey* (Lexington, KY. 1962).

27 John A. Williams, *Appalachia: A History* (Chapel Hill 2002), p. 281.

28 Orin B. Graff, "The needs of education" In T. R. Ford, ed. *The Southern Appalachian Region: A Survey* (Lexington, KY 1962).

29 Grady McWhiney, *Cracker Culture: Celtic Ways in the Old South* (Tuscaloosa 1988), p. 193.

30 Paige Smith, *As a City Upon a Hill: The Town in American History* (New York 1966), pp. 242–247.

Education has been implicated as both cause and effect of economic development in the Northeast and the Midwest[31] and in regional differences in inequality. For investment in human capital (i.e. education) in the North and Midwest contributed to industrial growth and economic expansion, which in turn provided much of the tax base that supported schools and also worked to reduce inequality. In the southern states, local re-investment of profits both in industry and for education, was much less.[32] Hence, even though inequality of wealth was high throughout much of the country in the 18th and 19th centuries,[33] it was higher in the South than elsewhere[34] and has remained so.

Income inequality remained high nationwide during the first three decades of the 20th century as a result of the unequal growth of manufacturing in different regions of the country,[35] for wage gains were much greater in manufacturing than in agriculture. Inequality declined during the years of the New Deal and World War II as wage gains became greater in agriculture than in manufacturing, but it began to increase again in the 1970s, moreso in large states "with high income and manufacturing wages in 1970."[36] Manufacturing jobs were lost and service jobs increased, many of them in industries that require advanced education, e.g. financial services and information technology. Thus both median household income and income inequality grew where there were job losses in manufacturing and job gains in more lucrative employment requiring advanced and technical education and training. This was in places where the social and institutional infrastructure already existed to produce the new labor force. Nonetheless, inequality still remained lower in such regions than in the South, where growth of jobs in services may have been constrained by high rates of functional illiteracy and low levels of technical training.[37]

Arguably, the significance of the consistent association between education and mortality as contrasted with the inconsistent and even non-existent associations

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31 D. C. North, *op. cit.*, pp. 133–136.

32 D. C. North, *op. cit.*, pp. 133–136.

33 David H. Fischer, *Albion's Seed: Four British Folkways in America* (New York 1989), pp 751, fn. 9; 752, fn. 10; 169, fn. 5; Clayne Pope, "Inequality in the nineteenth century," In S.L. Engerman and R.E. Gallman, eds. *The Cambridge Economic History of the United States: Vol. II, The Long Nineteenth Century* (New York 2000), 2000, p. 129.

34 D. C. North, *op. cit.*, pp. 133, 155.

35 R. D. Plotnick, E. Smolensky, E. Evenhouse, and S. Reilly, "The twentieth-century record of inequality and poverty in the United States," in S. L. Engerman and R. E. Gallman, eds. *The Cambridge Economic History of the United States: Vol. III, The Twentieth Century* (New York 2000).

36 R. Morrill, "Geographic variations in change in income inequality among US states, 1970–1990", *Annals of Regional Science*, 34 (2000), 109–130.

37. C. E. Heim, "Structural changes: regional and urban", in S. L. Engerman and R. E. Gallman, eds. *The Cambridge Economic History of the United States: Vol. III, The Twentieth Century* (New York 2000), p.133.

between income and inequality on the one hand and mortality on the other is attributable to both its individual and societal impacts. For in addition to its very real consequences for individuals, the level and quality of support for public education speaks volumes about a society's concern for the well being of its members, and its ability to renew itself and to grow. For instance, Caldwell has shown that in poor countries mortality has been reduced substantially when there is a political culture that supports universal education for both women and men.[38] In that sense, educational achievement is a proxy for a congeries of factors that go beyond a simple variable like the graduation rate from high school. Such factors include, but are not limited to, political and economic institutions and culture. These are dimensions of social structure that are not generally included in the repertoire of explanatory variables invoked by epidemiologists and that too often remain unexamined, for they are difficult to measure, particularly if the only source of data is surveys of individual members of the population. However, while differences in educational attainment are deeply embedded in regional cultures, education has an association with mortality that is more than a proxy for other variables. This is not the case with income inequality.

Is the differential decline of mortality the result of some of these same regional processes? That is not clear, but a plausible argument can be made that at least some of it is. The decline of ischemic heart disease began in the affluent, more highly educated and urbanized areas of the East and West Coasts and spread to more rural and southern parts of the country, a process that Wing et al. have likened to cultural diffusion.[39] Consistent with the mortality data, self-reported histories of smoking and of myocardial infarction and ischemic heart disease are more common in the southern states than elsewhere;[40] self-reported health is worse and is more concentrated among the poor in the South than elsewhere;[41] and the prevalence of physical inactivity[42] and obesity are higher in the South, particularly the rural South, than elsewhere.[43]

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38 Jack C. Caldwell, "Routes to low mortality in poor countries", *Population and Development Review* 12 (1986), 171–220.

39 Steve Wing, M. Casper, W. Riggan, E. Hayes and H. A. Tyroler, "Socioenvironmental characteristics associated with the onset of decline of ischemic heart disease mortality in the United States", *American Journal of Public Health*, 78 (1988), 923–926.

40 Centers for Disease Control and Prevention, "Prevalence of Heart Disease – United States, 2005", *MMWR* 56 (2007): 113–116.

41 K. T. Xu, "State-level variations in income-related inequality in health and health achievement in the US.", *Social Science & Medicine* 63 (2006), 457–464.

42 S. L. Martin, G. J. Kirkner, K. Mayo, C. E. Matthews, J. L. Durstine, and J. R. Herbert, "Urban, rural, and regional variations in physical activity", *The Journal of Rural Health* 21 (2005), 239–244.

43 Centers for Disease Control and Prevention, "Surveillance for certain health behaviors among states and selected local areas – Behavioral Risk Factor Surveillance System, United States, 2003." In *Surveillance Summaries*, December 2, 2005, MMWR 54 (No. SS-8): 1–116.

The point is not that the past is a prison from which there is no escape. Clearly there has been change. Continuing immigration from abroad as well as internal migration among states has influenced population composition and social institutions. The growth of cities, and the emergence of new industries and the decline of old ones has led to great changes in income, equality, and economic returns to education. Politicians and their publics make decisions that have profound effects. For instance, North Carolina in the mid-20th century had already established a reputation for honest government and for an outstanding university that distinguished it from much of the rest of the South.[44] And of course changes in federal policy, from civil rights to the structure of the tax code, have a profound impact on political institutions and participation, income distribution, and health. Nonetheless, despite the difficulties of disentangling past influences from contemporary ones, it is evident that the past casts a long shadow across arbitrary state borders, both with respect to political and cultural values,[45] and by shaping institutional alternatives available in the present, a process that economic historians have called path dependence.[46]

Concluding Comments

I began by observing that C. Wright Mills's critique of abstracted empiricism was prescient, for he pointed to issues that would loom large in years to come: its a-historical nature; the psychologism that deflected attention from social structure; the remoteness of investigators from the reality of their subjects' lives; the obsession with Method; and the transformation of social research from craft to bureaucratic enterprise. All this has come to pass. Yet it has not been without benefit. Much useful information has been gained, in social epidemiology as well as in other domains, and fruitful debates about issues relevant to important public policies have occurred.

Nonetheless, much of his critique continues to be relevant to epidemiological research, particularly its a-historical and de-contextualized nature. My argument has not been that the techniques he criticized are intrinsically worthless. And no doubt many investigators use a combination of methods to both describe and explain the

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44 V. O. Key, Jr. *Southern Politics in State and Nation* (New York 1950), p. 205.

45 J. L. Hammond, *The Politics of Benevolence: Revival Religion and American Voting Behavior* (Norwood, N J 1979). J. M. Glaser, *The Hand of the Past in Contemporary Southern Politics* (New Haven 2005). E. Black, and M. Black, *Politics and Society in the South* (Cambridge 1987). J. S. Reed, *Minding the South* (Columbia 2003).

46 Paul A. David, "Path Dependence, Its Critics and the Quest for 'Historical Economics'." Working paper, All Souls College, Oxford University. http://www-econ.stanford.edu/faculty/workp/swp00011.html, 2000.

social distribution of morbidity and mortality. Rather, my example has been meant to show that these methods are most useful when the results are understood in their particular historical and social context. When measures such as social stratification, income inequality, and education are analyzed out of context, the social environment becomes at best a black box, the vague "milieux" about which Mills complained. That is not sufficient if we are ever to truly understand the impact of social status, wealth and income, and inequality on the health of individuals and populations.

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