Economic Research Initiative on the Uninsured
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Urban/Rural Differences in Excess Mortality Among High Poverty Populations: Evidence from the Harlem Health Survey and Pitt County Hypertension Study

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What features of urban versus rural populations or environments could explain these dramatic differences in rates of excess mortality among poor, African Americans? The range of speculation is broad. Possibilities include differences in health behaviors, diet, social cohesion, social and physical environmental exposures, and health care.[1] Interestingly, the literature on urban/rural differences in these possible risks is sparse, and is more often used to explain presumed rural health disadvantages than urban ones. For example, tobacco use and physical inactivity are two of the most widely cited health behavior risks. On average, adults living in rural counties are most likely to smoke tobacco cigarettes, and those living in metropolitan counties are least likely to do so, according to the National Center for Health Statistics (Eberhardt et al. 2001). Physical inactivity is also highest among those in rural areas compared to urban areas (Eberhardt et al. 2001).

Similarly, at first blush, the possibility that excess mortality among urban compared to rural high poverty populations would be due to differences in access to preventive health services or medical care appears counterintuitive. Generally, rural areas are more likely than metropolitan areas to be medically underserved. Pendleton and Chang (1979) conclude, "In general, there is greater per capita medical care available to urban populations." Rural areas have fewer hospital beds, doctors, nurses, and specialists per capita than more urban areas (Smith et al. 1995). Owing to geographic isolation and decreased population per square mile, traveling long distances for health care services may be much more common among rural than urban dwellers. Inaccessibility to public transportation, may also make it "difficult for rural communities to provide the formal long-term health care and home care services available to

[1]Another possibility is that these differences are artifacts of health-related migration. We are investigating this possibility in a separate analysis. Our preliminary findings are not supportive of the "artifact" explanation for

urban dwellers" (Smith et al. 1995). In rural areas, roads are more poorly maintained, vehicular accidents more prevalent, and emergency services are slower to respond (Wright 1985), pointing to an urban advantage in these areas. Smith et al. (1995) also observe that the range of services available in rural areas are fewer in terms of both health care facilities and health care providers. The use of preventive health services varies widely from urban to rural areas. Casey et al. (2001) found that "cancer tends to be diagnosed at more advanced stages among rural populations." Rural residents were more likely to underuse mammography services and obtain other preventive health services including health screenings, (Casey et al. 2001). Similarly, Higginbotham et al. (2001) conclude that rural residents, particularly rural female African Americans, have "less access to, or utilization of, early cancer detection programs and/or quality medical care."

More auspicious for rural residents – comparisons suggest they may enjoy greater social support or social cohesion than urban residents. Social cohesion is "the degree to which groups of people feel connected, share resources, and provide moral support," (Reidpath 2003). Social cohesion has been widely cited as having protective effects against many ailments and the level of social cohesion has been associated with a population's health (Reidpath 2003). It may be measured in terms of kinship networks, community ties, social support or even marital status. Findings by Smith et al. (1995) conclude that people living in rural settings are "more likely to be married and least likely to be widowed, divorced, or separated when contrasted with those living in central cities." Marriage can be an important form of social support. The National Longitudinal Mortality Study has also concluded that being married or living with a long-term partner "is conducive to longevity" (Smith et al. 1995). Widowhood, however, is more detrimental for people living in urban areas than for those living in rural or suburban areas.

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this particular geographic patterning of health.

Divorce and separation have been found to increase mortality across all levels of urbanization, suggesting that those areas with the highest levels of divorce and separation will suffer the greatest (Smith et al. 1995). Rural areas have also been noted as having "stronger kinship networks and community ties," which could be associated with a rural advantage in morbidity and mortality, although much of the other evidence surrounding this topic is inconclusive (Smith et al. 1995).

Overall, a review of the general urban/rural health literature would not predict the large rural mortality advantages we found. The magnitude of the rural mortality advantage we observed, when comparing specific rural versus urban populations, far exceeds any that have been estimated in analyses of national data sets that average across rural or urban populations (Elo and Preston 1996; Hayward et al.1997; House et al. 2000; Kitagawa and Hauser 1973; Smith et al. 1995). Moreover, some aspects related to health care access, for example, or smoking behavior would lead us to expect rural residents to have a mortality disadvantage compared to urban residents. However, the extent to which African American residents of *high poverty* urban areas as compared to *high poverty* rural areas differ in health status, health behaviors, environmental exposures, social cohesion or access to medical care all remain empirical questions. To our knowledge, no study has focused on comparisons of just such areas.

When limiting one's focus to high-poverty black areas, there are reasons to rethink whether smoking behavior or medical care access is, indeed, better than in high poverty rural communities. For example, Northridge et al. (1998) found that "Harlem residents were almost twice as likely to be current smokers as New York state residents or New York state non-Hispanic Blacks." Smoking attributable fractions were also computed and indicated higher proportions of lives could have been saved in Harlem as compared to New York City or the

United States from various causes of death linked to smoking. The authors suggest that "most Harlem residents have yet to benefit from knowledge about the health consequences of smoking," although they do not have any data on health education knowledge of this population to test their impression (Northridge et al. 1998).

Observed increases in excess deaths in high poverty urban areas over the 1980s suggest that despite the fact that, on average, rural residents are medically underserved compared to metropolitan residents, there are several reasons to consider the possibility that access to medical care, however wanting it is for poor rural African Americans, may now be as or more problematic for residents of high poverty central cities. These possibilities are consistent with persistent urban/rural mortality differences generally, and the substantial increases seen since 1980. Since 1980, many inner-city, out-patient departments have closed; public hospitals have reduced staff; while remaining hospitals have less incentive or ability to provide uncompensated care in a managed care environment (Schlesinger 1987; Schelsinger and Kronebusch 1990). As perceptions of inner-city neighborhoods as dangerous places have grown, few health care providers locate their practices in central cities, intensifying logistical barriers to access (Fossett et al. 1990). Moreover, macroeconomic restructuring intensified black unemployment and underemployment, particularly in central cities (Oliver and Shapiro 1995). In a system where health insurance coverage is primarily employment-based, employment differences between the urban and rural poor may be critical.

More indirectly, we found that while rural residents in the African American high-poverty populations we studied have significantly longer life expectancies than urban residents, their functional status was only modestly better (Geronimus et al. 2001). Gains in life expectancy associated with rural residence compared with urban residence are primarily gains in

inactive years. While there are others, one possible explanation for this divergence in patterns of infirmity and mortality might be differential access to health care between poor black urban and poor black rural residents that favors rural residents. In this scenario, medical care would serve to help rural residents to avert early mortality, even in the presence of high morbidity. Further, the similarity in rates of functional limitations between the urban and rural populations might throw cold water on competing explanations related to health behaviors or environmental exposures, all of which may exert effects on mortality through their impact on disease incidence.

Providing us a unique opportunity to begin to probe the reasons behind the mortality differences, two of our local study populations, one urban and one rural, have been the site of in-depth health surveys – the Harlem Health Survey (HHS) and the Pitt County Hypertension Survey (PCS). With a poverty rate of 36% (compared to a national white poverty rate of 7%) excess death rates for black residents of Pitt County, North Carolina in 1990 (compared to whites nationwide) were 504 for men, and 224 for women. As noted above, in Harlem, New York City, the poverty rate was somewhat higher (43%), but excess death rates among black residents in 1990 were more than double those in Pitt County, at 1,296 (for men) and 534 (for women).

Data and Methods

The PCS is a prospective cohort study designed to investigate psychosocial, anthropometric, and behavioral risk factors of hypertension among African American adults in Eastern North Carolina. Based on a community probability sample of black households within Pitt County, North Carolina, 1,784 individuals aged 25-50, were interviewed in 1988 and followed-up in 1993.

The HHS was conducted between 1992 and 1994. Six hundred ninety-four adults aged 18-65 were drawn from randomly selected households in the Central Harlem Health District and

interviewed. Both surveys include detailed questions concerning health care utilization and access, specific health conditions, health behaviors, diet, social support, and sociodemographic characteristics.

Both included multiple clinical measurements of blood pressure taken at the interview. The HHS included self-reported height and weight, and physical measurements were taken during the PCS interview, including height, weight, waist and hip circumference.

We identified several variables that were comparable across the two surveys and are meant to represent a range of possible explanations for the urban/rural mortality differential observed between Harlem and Pitt County. These are:

Health Status Indicators

Body Mass Index (BMI) – we classified respondents in the two surveys according to NIH guidelines and focused on three groups: Obese or Morbidly Obese (BMI of 30 or greater), Overweight (BMI of 25-29.9) , and Normal Weight (BMI of 18.5-24.9)**.**

Hypertension – we classified respondents as hypertensive if they had a mean systolic blood pressure 140 mm Hg or a mean diastolic 90 mm Hg on exam, or reported currently taking antihypertensive medication.

Health Behavior

Smoking – we classified respondents as smokers if they answered affirmatively to the question, "Are you currently a smoker?" (PCS) or, "Do you smoke now, regardless of whether you have smoked in the past?" (HHS).

Social Support

Partnered Status – We focused on respondents who answered that they were either currently married or cohabiting, widowed, or never married when asked: "Are you currently...?"

We also quantified the percentage who reported that they had been married to or lived with their partner for 20 or more years.

Social Support Indicator – We also categorized respondents according to whether they answered 'usually" or "never" to the question, "If you are worried about an important personal matter, how often would there be somebody you could go to?" (PCS) or, "When you are concerned about a personal matter, how often do you talk about it with someone?" (HHS)

Employment

Working – We classified respondents according to whether they answered affirmatively to the question, "Are you working now for pay?" (PCS) or "Are you currently working for pay?" (HHS)

Medical Care

Usual Source of Care – We classified respondents as having a usual source of care if they responded affirmatively to the question, "Is there a place you usually go to when you are sick or have health concerns?" (PCS) or, "Are there any particular health people you see or places where you usually go when you are sick or need advice about your health?" (HHS)

Health Insurance

Because the Pitt County Survey does not include health insurance data, we used supplementary data to impute health insurance for our two populations. Using a combination of the March Current Population Survey (CPS) data and the Public Use Micro Data (PUMS) from the 1990 census, we estimated the fraction of each of our low income populations who are covered by either public or private insurance. The CPS data asks individuals detailed questions regarding insurance coverage, as well as demographic and employment information about the individual. We could not use the CPS itself to calculate the fraction of individuals in each of our

populations covered by insurance because CPS sample sizes are too small and the CPS does not release detailed geographic information about respondents. What we were able to do was to use the CPS to estimate the probability that an individual will be covered by private insurance as a function of the employment characteristics of various members of the household. For black men and women who lived in either northern central cities or nonmetropolitan areas of the south, we calculated the fraction covered by private health insurance as a function of their own employment status and, for those married, the employment status of their spouses. We then used these estimated fractions, together with information on the employment and marital status of blacks living in Harlem and Pitt Country derived from the PUMS data to estimate the probability that blacks living in these two areas were covered by private insurance (see appendix for details).

The calculations were, of necessity, crude. Information such as firm size, which is known to be an important determinant of whether firms do or do not offer employees health insurance as a benefit is simply not available in the Census. In the end, we categorized individuals as working full time for a private employer, a public employer or as self-employed. Those not working at all of not working full time were put into a fourth category.. It seems reasonable to assume that the jobs that residents in Harlem or Pitt county have are less likely to offer benefits than the typical job held by northern urban or southern rural blacks. This implies that we are likely to overestimate the fraction of the population covered by insurance. It also seems plausible that, if anything, this bias would be bigger in Harlem than in Pitt County. In the case of Harlem it was possible to actually compare our imputations to survey responses on the HHS.

We compared Pitt County and Harlem respondents on all of the health characteristics listed above using sample weights and age-standardizing the Pitt County sample to the Harlem Health Survey sample. We compared the overall samples, and by men and women separately.

Results

Table 2 reports differences in health characteristics between Harlem and Pitt County overall, and by gender. Overall, differences between Harlem and Pitt County are highly statistically significant in all cases (there are a couple of gender specific exceptions, discussed later). Most health characteristics favor the Pitt County respondents, but to varying degrees. BMI is the only exception.

<Insert Table 2 about here>

Health Status Indicators

BMI – According to NIH standards, Pitt County residents are much more likely to have Body Mass Indices that place them in the obese or overweight categories, and less likely to have BMIs in the normal range than Harlem residents. Indeed, 40% of Pitt County respondents are obese. This places them well above the national average for that time period of about 22% (NHANES III, 1988-94). At 25%, the obesity rate for the Harlem respondents is only slightly higher than the national average. Pitt County residents are also more likely to be overweight (37%) than Harlem residents (33%), or than the national average for the time period (33%). Conversely, 41% of Harlem compared to only 22% of Pitt County residents have Body Mass Indices in the normal range, according to NIH BMI standards. This compares to national averages for the time period of 42%.

Compared to black national averages of the time period, Pitt county respondents are far more likely to be obese or overweight and far less likely to be normal weight. However, Harlem

men or women are less likely to be obese or overweight and more likely to be normal weight than national black averages. For example, a full 82% of women and 69% of men in Pitt County are obese or overweight compared to 68% of black women nationwide and 58% of black men nationwide. A lower percentage of Harlem men or women are obese or overweight at 52% and 51%, respectively.

Hypertension – Harlem respondents are more likely to be hypertensive than Pitt County respondents. At 33% and 27%, respectively, both groups were well above national averages of the time period, estimated to be about 20% using NHANES III data. However, the Harlem average was comparable to the black national average (32%), while the Pitt County average was below it.

Health Behavior

Smoking – Thirty-five percent of Pitt County respondents report being current smokers, while 44 % of Harlem residents do. In both cases, this is higher than statewide or national averages (about 25% of adults in the United States smoke, as do 26% in North Carolina and 22% in New York State). The largest differences between the Harlem and Pitt County respondents are among women. While in both areas, men are more likely to be smokers than women, the gender differences in Harlem are small compared to those in Pitt County, and current smoking among men is not statistically significantly different across the two areas. Forty-seven percent of men in Harlem, compared to 41% of women reported being current smokers. In Pitt County, 44% of men compared to 29% of women are current smokers. In all cases, current smoking rates exceeded the black national average for 1990 of 34.5 for black men and 22.4 for black women.

Social Support

Partnered status – Being partnered is more common among Pitt County residents than Harlem residents. Forty-nine percent of Pitt County residents are currently married or cohabiting compared to 21% of Harlem residents. Twenty-four percent of Pitt County residents report being never married, compared to 45% of Harlem residents. About equal percentages of residents of both areas are divorced or separated (not shown), while a higher percentage of Harlem residents are widowed (8%) than Pitt County residents (4%). Given the fewer number of marriages in Harlem, having higher percentages of widows and comparable percentages of those divorced or separated suggests that marriage is more precarious in Harlem than in Pitt County. In addition, 15% of Pitt County residents report marriages of at least 20 years duration, compared to only 4% of Harlem residents.

Differences in partnered status are small by gender in Harlem, but substantial in Pitt County. In Pitt County, 60% of men compared to 43% of women are currently married. 29% of women compared to 17% of men have never been married. Of those who are married, 17% of men, compared to 14% of women have been married for at least 20 years.

Social support indicator – Regarding the social support question that was common to the two surveys, 72% of Pitt County residents, but only 41% of Harlem residents responded that they usually would have someone to talk to if they were concerned about a personal matter.

Differences by gender were very small in Pitt County (73% for women and 71% for men), but larger in Harlem (44% for women, 35% for men). Moreover, Harlem men (30%) were more likely than Harlem women (19%) or Pitt County men (3%) or women (6%), to answer "hardly ever (never)" to this question.

Employment

Differences in employment are quite large between the two sets of respondents. Seventy-five percent of Pitt County respondents, but only 48% of Harlem respondents report that they are currently working for pay. While men in both areas are more likely to be working than women, the differences between men in the two areas are the most stark. Eighty-six percent of Pitt County men, but only 52% of men in Harlem report working for pay.

The differences in rates of employment also indicate the lesser probability that Harlem residents can benefit from employer based health insurance and suggest the possibility that employment differences may be important determinants of differences in health insurance coverage.

Medical Care

Contrary to conventional wisdom, risk factors associated with medical care access appear to favor the rural respondents. Only 8% of Pitt County respondents, but 25% of Harlem respondents report having no usual source of health care. Pitt County women are especially likely to report having a usual source of care: 95% compared to 79% of Harlem women. Harlem men appear to be the worst off with only 64% reporting a usual source of care, compared to 87% of men in Pitt County.

Health Insurance

Our imputations suggest that a similar proportion of Pitt County and Harlem respondents have some form of health insurance, but that Pitt County respondents are more likely to have private health insurance. As listed in Table 3, about 10% more of Pitt County respondents are imputed to have private health insurance than Harlem respondents. What drives these differences are the differences across the populations in terms of the fraction that are married or

the fraction with jobs. Indeed, had we used a common set of set of insurance rate numbers for both populations, the estimated difference in employment rates would be even bigger than it is.

<Insert Table 3 about here>

Our calculations may be an underestimate of the true difference in private health insurance coverage between Harlem and Pitt County. As noted in the methods section, our imputation approach is likely to overestimate private health insurance coverage, especially in Harlem. Indeed, we note that estimates of private health insurance coverage based on HHS survey responses show Harlem respondents to be less likely to have private health insurance than our CPS estimates at about 41% (HHS) versus 51% (CPS) for men and 44% (HHS) versus 54% (CPS) for women.

In sum, Pitt County and Harlem differ significantly on all risk factors. BMI strongly favors the Harlem respondents who are much less likely to be obese, less likely to be overweight, and much more likely to be normal weight by NIH standards than Pitt County respondents. Some of the difference in BMI between Harlem and Pitt County may well be due to the fact that heights and weights are self-reported in the HHS but clinically measured in the PCS. However, that does not affect the higher rates of overweight and obesity in Pitt County compared to national data, which were also determined by clinical measurement. The other risk factors studied most often favor Pitt County, although to varying degrees. These are: hypertension, smoking (but not among men), partnered status, social support, employment, having a usual source of medical care, and health insurance.

Simulations

As we have seen, the surveys we have been working with show large, statistically significant differences between Harlem and Pitt Country in various population characteristics

that would be likely to affect mortality rates in the two places. To get a sense of whether the differences observed in the surveys could possibly account for the differences in mortality rates, we did simple calculations to see how much lower Harlem mortality rates could be if Harlem residents had the same distribution of characteristics as did the Pitt County residents. To do so, we reviewed the literature on the effect of each characteristic on mortality to derive estimates of relative risk of mortality in each case (see the appendix for details). These calculations are meant to be illustrative. While the estimates of relative risks we use are typically widely cited, they are based on observational studies, and one can question whether the estimated associations are causal. Moreover, the samples used are typically nationally representative, and are never limited to blacks living in poor urban or rural areas.

It will be easiest to explain the calculations we did with an example. Let S^h represent the share of Harlem men who smoke. Friedman et al. (1997) estimate that smoking raises mortality rates among working-aged black men by a factor of 1.8. Harlem mortality rates are a weighted average of the smoking and non-smoking rates:

$$m^h = S^h\,(1.8\,m_0{}^h) + (1 - S^h)\,m_0{}^h,$$

where m^h represents the overall male mortality rate and $m_0{}^h$ the non-smoking mortality rate in Harlem. If mortality rates conditional on smoking status were to have remained what they were, but smoking rates to have changed to those found in Pitt County, the mortality rate in Harlem would have been:

insert equation

where S^p represents the share of men in Pitt County who smoke. The ratio of these two quantifiers is:

insert equation

Note this ratio will be below one if, as is the case, the share of men in Pitt County who smoke, S^p is less than the share of men in Harlem who do, S^h. Alternatively, if the share in Pitt County were larger than it is in Harlem, the ratio would be above 1. The above formula is easily generalized to the case where the characteristic in question is poly rather than dichotomous.

The number we actually report in Table 4 is ***insert equation*** which can be interpreted as the percentage change in mortality rates that Harlem men would experience if they smoked as much as Pitt County men do. In cases where Pitt County residents are advantaged relative to those in Harlem, as is true for most of the characteristics listed in Table 2, we expect this number to be negative. In cases where Pitt County residents are disadvantaged, we expect the number to be positive.

Results of this exercise are reported in Table 4. According to our estimates, health conditions or behavior account for very little of the excess mortality in Harlem compared to Pitt County, with the exception of smoking among women which is estimated to account for 23.4% of the difference in female mortality rates in Harlem as compared to Pitt County. For men, partnered status and employment differences account for substantial shares of the mortality rate differences at about 40% and 34%, respectively. For women, the social support indicator of having someone to talk to in time of need is estimated to account for 30% of the excess mortality in Harlem compared to Pitt County. Harlem men and women are estimated to benefit substantially from having the distribution of health insurance coverage (private, public, none) of Pitt County residents. Our estimates suggest that differences in health insurance account for 56% of the mortality gap for men, and 47% for women.

<Insert Table 4 about here>

Discussion

Although rates of excess mortality in Harlem are substantially higher than those in Pitt County, especially among men, we found only small differences in health status indicators between respondents in the Harlem Health Survey and the Pitt County Hypertension survey. Rates of hypertension and smoking generally showed differences that were small between the two populations, while rates of obesity or overweight favored Harlem. With the exception of smoking among women, our simulations suggest that none of these health status indicators explain much of the observed mortality differences.

In contrast, our estimates suggest the possibility that access to social support indicated by partnered status among men, and the ability to find someone to talk to in time of need among women, to employment, especially among men, and to health insurance for both men and women could account for a substantial share of the mortality gap between Harlem and Pitt County residents. These findings are consistent with the possibility that African American residents of high poverty rural areas are better able to avert mortality than morbidity.

Our findings related to Body Mass Index are curious. Although we think differences in the ways these were measured in Harlem (self-report) compared to Pitt County (clinical measure) undermine the validity of the comparison, they do not explain why Pitt County residents who have very high BMIs do not also have very high hypertension rates – which were also based on clinical measures – or mortality rates. These findings suggest caution in taking at face value that obesity, per se, causes cardiovascular morbidity or mortality. We would have liked to also consider physical activity, diet, and other obesity-related health outcomes, such as diabetes and musculoskeletal diseases. However, the data did not permit comparisons between Harlem and Pitt County in these health characteristics or behaviors.

At face value, our findings on health insurance are striking. According to our estimates, increasing access to private health insurance (as opposed to public or no health insurance) might reap major benefits for Harlem residents in averting excess mortality.

Although the surveys analyzed provided us an opportunity to begin to sort between possible explanations for the urban/rural mortality differences we have described among high-poverty African American populations, our ability to consider any given potential explanation was limited to whether both surveys included items pertaining to the potential risk factor, and whether questions used in those items were comparable. Thus, for example, we were unable to consider environmental exposures that may also have an impact on differences in rates of excess mortality between rural and urban populations. Factors in the environment that may affect excess mortality include: population density and environmental toxins. The increased population size and density, when compared with rural settings, could lead to an increased risk of infectious disease in urban areas where people are often in very close quarters, both in their living and working places (Smith et al. 1995). Environmental toxins may also be more likely concentrated in urban areas than rural ones and, therefore, may contribute to cancer death rates in urban areas (Wright et al. 1985).

While data limitations in and across the two surveys were highly restrictive, our findings do suggest that the stylized wisdom about the relative health disadvantages or advantages of rural compared to urban areas may not hold among high poverty, African American, urban and rural areas. In contrast to the stylized wisdom, smoking rates appear to be as high or higher in such urban areas compared to rural ones, especially among women. Rates of private health insurance are substantially higher in such rural areas. Despite issues regarding number of health facilities and distances between them which would seem to favor urban residents, other factors –

insurance, among them – may have created a situation in the 1990s where African American residents of high poverty urban areas were more medically underserved than African American residents of high poverty rural areas.

References

Casey MM, Thiede CK, Klinger JM. Are rural residents less likely to obtain recommended preventive healthcare services? *American Journal of Preventive Medicine* 2001; 21(3):182-188.

Durazo-Arvizu R, Cooper R, Luke A et al. Relative weight and mortality in US blacks and whites: Findings from representative national population samples. *Annals of Epidemiology* 1997;7:383-395.

Eberhardt MS, Ingram DD, Maku DM et al. *Urban and Rural Health Chart Book*. Health, United States, 2001. Hyattsville, MD: National Center for Health Statistics, 2001.

Elo IT, Preston SH. Educational differentials in mortality: United States, 1979-85. *Social Science & Medicine* 1996;42:47-57.

Fossett JW, Perloff JD, Peterson JA, Kletke PR. Medicaid in the inner city: The case of maternity care in Chicago. *The Milbank Quarterly* 1990;68(1):111-141.

Franks P, Gold MR, Clancy CM. Use of care and subsequent mortality: The importance of gender. *Health Services Research* 1996;31(3):347-364.

Friedman GD, Tekawa I, Sadler M, Sidney S. Smoking and mortality: The Kaiser Permanente Experience. In *NCI: Smoking and Tobacco Related Monographs: Number 8: Changes in Cigarette Related Disease Risks and their Implications for Prevention and Control*. February 1997.

Geronimus AT, Bound J, Waidmann TA, Colen CG, Steffick D. Inequality in life expectancy, functional status, and active life expectancy across selected black and white populations in the United States. *Demography* 2001;38(2):227-251.

Geronimus AT, Bound J, Waidmann TA. Poverty, time and place: Variation in excess mortality across selected U.S. populations, 1980-1990. *Journal of Epidemiology and Community Health* 1999;53(6):325-334.

Geronimus AT, Bound J, Waidmann TA, Hillemeier MM, Burns PB. Excess mortality among blacks and whites in the United States. *New England Journal of Medicine* 1996;335:1552-1558.

Hayward MD, Pienta AM, McLaughlin DK. Inequality in men's mortality: The socioeconomic status gradient and geographic context. *Journal of Health and Social Behavior* 1997;38:313-330.

Higginbotham JC, Moulder J, Currier M. Rural v. urban aspects of cancer: First-year data from the Mississippi Central Cancer Registry. *Family Community Health* 2001;24(2):1-9.

House JS, Lepkowski JM, Williams DR, Mero RP, Lantz PM, Robert SA, Chen J. Excess mortality among urban residents: How much, for whom, and why? *American Journal of Public Health* 2000;90(12):1898-1904.

Kitagawa EM, Hauser PM. *Differential Mortality in the United States: A Study in Socioeconomic Epidemiology*. Cambridge, MA: Harvard University Press, 1973.

Northridge ME, Morabia A, Ganz ML, Bassett MT, Gemson D, Andrews H, McCord C. Contribution of smoking to excess mortality in Harlem. *American Journal of Epidemiology* 1998;147(3):250-258.

O'Donnell CJ, Ridker PM, Glynn RJ, Berger K, Ajani U, Manson JE, Hennekens CH. Hypertension and borderline isolated systolic hypertension increase risks of cardiovascular disease and mortality in male physicians. *Circulation* 1997;95:1132-1137.

Oliver ML, Shapiro TM. *Black Wealth/White Wealth: A New Perspective on Racial Inequality*. New York: Routledge, 1995.

Pendleton BF, Chang HC. Ecological and social differentials in mortality: Inequalities by metropolitan-nonmetropolitan residency and racial composition. *Sociological Focus* 1979; 12(1): 21-35.

Reidpath DD. "Love thy neighbour" – It's good for your health: A study of racial homogeneity, mortality and social cohesion in the United States. *Social Science & Medicine* 2003;57(2):253-261.

Schlesinger M. Paying the price: Medical care, minorities, and the newly competitive health care system. *The Milbank Quarterly* 1987;65(Suppl 2):270-296.

Schlesinger M, Kronebusch K. The failure of prenatal care policy for the poor. *Health Affairs* 1990;winter:91-111.

Schoenbach VJ, Kaplan BG, Fredman L, Leinbau DG. Social ties and mortality in Evans County, Georgia. *American Journal of Epidemiology* 1986;123:577-591.

Smith MH, Anderson RT, Bradham DD, Longino CF. Rural and urban differences in mortality among Americans 55 years and older: Analysis of the National Longitudinal Mortality Study. *The Journal of Rural Health* 1995;11(4):274-285.

Sorlie PD, Backlund E, Keller JB. US mortality by economic, demographic, and social characteristics: The National Longitudinal Mortality Study. *American Journal of Public Health* 1995;85(7):949-956. (see page 953 for relative risks)

Sorlie PD, Johnson NJ, Backlund E, Bradham DD. Mortality in the uninsured compared with that in persons with public and private health insurance. *Archives of Internal Medicine* 1994;14: 2409-2416.

US DHHS NHANES III, 1988-1994.

Wright JS, Champagne F, Dever GEA, Clark FC. A comparative analysis of rural and urban mortality in Georgia, 1979. *American Journal of Preventive Medicine* 1985;1(1):22-29.

Table 1. Measures of mortality among 15 through 64 year-old black residents of selected urban and rural high poverty areas and blacks and whites nationwide, 1990.

	Poverty Rate %	Annual Death Rate	Annual Excess Death Rate	Standardized Mortality Ratio (95% Confidence Interval)*	P 65**
National Average, Men					
Blacks	32	791	374	1.90 (1.88, 1.91)	0.62
Whites	7	417	0	1.00 (1.00, 1.00)	0.77
Black Men, High Poverty Areas					
Urban:					
Harlem	43	1,713	1,296	4.11 (3.91, 4.31)	0.37
South Side Chicago	54	1,713	1,296	4.11 (3.88, 4.34)	0.37
Rural:					
Delta Louisiana	47	808	391	1.94 (1.78, 2.10)	0.60
Eastern North Carolina	36	906	489	2.17 (2.02, 2.33)	0.57
National Average, Women					
Blacks	32	439	214	1.95 (1.93, 1.97)	0.77
Whites	7	225	0	1.00 (1.00, 1.00)	0.87
Black Women, High Poverty Areas					
Urban:					
Harlem	43	759	534	3.38 (3.15,3.61)	0.65
South Side Chicago	54	794	569	3.53 (3.27, 3.79)	0.63
Rural:					
Delta Louisiana	47	473	249	2.11 (1.89, 2.32)	0.75
Eastern North Carolina	36	421	197	1.88 (1.70, 2.05)	0.77

* Relative to whites nationwide, aged 15-65
** P 65 = Probability of survival to age 65

Table 2. Differences in health characteristics between Harlem and Pitt County, by gender and statistical significance.

Health Characteristic	Gender	Harlem %	Pitt County %	P-Value
BMI –OBESE	Overall	25.2	40.4	0.000
	Men	12.7	24.8	0.010
	Women	32.2	50.2	0.000
BMI-Overweight	Overall	32.7	36.7	0.019
	Men	38.1	44.0	0.004
	Women	29.5	32.1	0.529
BMI - Normal	Overall	39.9	21.5	0.000
	Men	47.9	29.0	0.000
	Women	35.2	16.8	0.000
Hypertension	Overall	33.1	27.3	0.000
	Men	34.5	28.7	0.001
	Women	32.1	26.4	0.001
Current Smoker	Overall	44.4	34.5	0.001
	Men	47.2	43.7	0.335
	Women	41.4	28.8	0.000
Partnered Status Currently	Overall	21.0	49.2	0.000
	Men	23.8	59.8	0.000
	Women	17.8	42.7	0.000
Partnered Status Never	Overall	44.9	24.3	0.000
	Men	49.0	17.3	0.000
	Women	45.4	28.6	0.000
Partnered Status > 20 years	Overall	3.6	15.4	0.000
	Men	2.2	17.2	0.000
	Women	4.0	14.2	0.000
Widowed	Overall	8.4	3.6	0.000
	Men	3.5	1.4	0.109
	Women	11.1	5.0	0.000

Working for Pay	Overall	48.4	74.6	0.000
	Men	52.4	85.8	0.000
	Women	43.0	67.7	0.000
Someone to talk to– USUALLY	Overall	40.5	71.9	0.000
	Men	35.2	71.0	0.000
	Women	44.3	72.5	0.000
Someone to talk to– NEVER	Overall	24.0	5.0	0.000
	Men	30.3	3.4	0.000
	Women	18.9	5.9	0.000
Usual Source of Medical Care	Overall	75.2	91.8	0.000
	Men	64.4	86.5	0.000
	Women	79.0	95.1	0.000
Health Insurance	Overall			
	Men	51	60	0.000
	Women	54	62	0.000

Table 3. Imputed health insurance

Area MEN	Private Health Insurance Weighted %*	Public Health Insurance Weighted %*	Any Health Insurance Weighted %*
Harlem	51.4	22.6	67.7
Pitt County	62.7	5.1	66.3

Area WOMEN	Private Health Insurance Weighted %*	Public Health Insurance Weighted %*	Any Health Insurance Weighted %*
Harlem	54.3	29.6	76.3
Pitt County	61.2	13.8	71.1

Table 4. Percent decrease/increase in Harlem mortality rate given Pitt County distribution of health characteristic and percent of Pitt/Harlem mortality gap plausibly explained by characteristic by gender

Health Characteristic	Percent Change Men	Percent Change Women	Percent Pitt/Harlem Gap Men	Percent Pitt/Harlem Gap Women
BMI	+8.0	+16.8	+17.4	+41.0
Hypertension	-2.1	-2.1	4.6	5.1
Current Smoking	-2.1	-9.6	4.6	23.4
Partnered Status	-18.3	-5.6	39.8	13.7
Social Support	-2.7	-12.3	5.9	30.0
Employment	-15.6	-5.4	33.9	13.2
Usual Source of Care	-2.1	-4.3	4.6	10.5

Health Insurance	-25.9	-19.2	56.3	46.8

Appendix A Imputing Health Insurance

Private health insurance

We extracted data from the 1990-1999 March Current Population Survey, limiting our sample to individuals who are black, aged 35-54 inclusive, and not in the military and who lived either in Northern central city or Southern non-metropolitan areas. We created four employment variables based on an individuals employment status for those who were single and based on either their own or their spouses employment status for those married, with spouse present. If either an individual or his or her spouse worked full time (35 or more hours per week) for the government we categorized them as being in a family with a full time government employee. Otherwise, if either the individual or his or her spouse worked for a private employer full time, we categorized them as being in a family with a full time private employee. Otherwise, if either the individual or his or her spouse was self-employed we categorized them living in a household with someone self-employed. If neither husband nor wife worked full time, then the individual would be put in a residual category.

We calculated the percentage of those covered by private health insurance based on self-report. These percentages were broken down by U.S. region (north and south) as well as by the four employment categories. In addition, we separated males from females and married, spouse present, from all other marital status categories.

We then extracted Census data from 1990 for those living in Harlem or Pitt County. We again limited the sample to blacks, aged 35-54 inclusive. For each individual in these samples we imputed a probability that they would be covered by private health insurance based on their gender, employment and marital status.

We then took a weighted average of these imputed. These numbers were calculated separately for males and females for each of our two areas.

Public health insurance

Using the 1990 Census data, we created variables for Medicaid and Medicare coverage based on an individual's receipt of social security and/or pubic assistance income. We then calculated, by state, the percentages of individuals receiving one or both of these types of coverage.

Any type of health insurance

To calculate the probability of having any type of health insurance, we took the weighted average of the imputed probabilities of having either public or private health insurance: $p\_any = p\_pub + (1 - p\_pub)p\_priv$. We then averaged these probabilities.

Appendix B Ascertaining Relative Risks for Simulations

For our simulations we used estimates of relative risks from the best studies we could find, many of which are widely cited, but they are all observational studies. One can question whether the estimated associations are causal. Moreover, rather than being based on high poverty urban or rural populations, the samples used are typically nationally representative, and are never limited to blacks living in poor urban or rural areas.

The specific studies we relied on and their place in the field are described here. For example, the relative risk of mortality due to smoking is taken from estimates derived by Friedman et al. (1997). This study is considered to be among the best in its field. The authors were part of a National Cancer Institute "Smoking and Tobacco Control" Monograph series started in 1991 to provide information regarding smoking and tobacco control to the public. The relative risk of mortality due to increased body mass index was obtained from a report by Durazo-Arvizu et al. (1997). This article is widely cited in the obesity and mortality literature and one of the only studies available which used a national sample. The hypertension and mortality relative risks were estimated from a report by O'Donnell et al. (1997). Unfortunately, the study was solely of male physicians, therefore, only relative risks for men could be obtained and then applied to women as well. However, this study is widely cited in the literature and is one of the few studies to report relative risks of mortality due to hypertension. The social support and mortality literature has a strong base in Sweden and Finland, with only a handful of studies in the United States reporting mortality risks. We used data from Schoenbach et al. (1986) to estimate the relative risks in our tabulations, as this was the only study to report data for black Americans. We used a study by Sorlie et al.(1995) to determine the relative risk of marriage as well as unemployment on mortality. This study is based on National Longitudinal Mortality Study data and, therefore, uses a nationally representative sample. The study is also widely cited and one of the few studies in the field reporting relative risks for the exact marriage and employment categories used in the Pitt County and Harlem surveys. The risk of having a usual source of care on mortality is estimated by Franks et al. (1996). This is the only study which estimates a risk for not having a usual source of care on mortality. The relative risk of not having health insurance was estimated using rates from Sorlie et al. (1994). This study is widely considered the best in its field as it was used in a larger Institute of Medicine report on health care coverage. Where possible, we used relative risks that were estimated on black populations, although in no case were we able to consider black poverty populations, per se. Similarly, we are more confident of the quality of some of the studies from which we derived relative risk estimates than others. In no case, do we believe that all unobserved factors that might affect relative risk estimates are accounted for, but we have tried to usu state-of-the-art estimates.

Specific relative risk estimates we derived from these studies and used in our simulations are listed here:

Smoking:
Relative Risk- Males: 1.8
Relative Risk- Females: 2.1
BMI:
BMI categories used: 1-<19, 2-19.21.9, 3-22.24.9, 4-25-27.9, 5- 28-30.9, 6- 31-33.9, 7->=34

Relative Risk Males (category 4 is reference group) Category 1: 1.70
Relative Risk Males Category 2: 1.45
Relative Risk Males Category 3: 1.21
Relative Risk Males Category 5: 1.06
Relative Risk Males Category 6: 1.12
Relative Risk Males Category 7: 1.52
Relative Risk Females (category 5 is reference group) Category 1: 1.82
Relative Risk Females Category 2: 1.59
Relative Risk Females Category 3: 1.05
Relative Risk Females Category 4: 1.07
Relative Risk Females Category 6: 1.27
Relative Risk Females Category 7: 1.32

Hypertension:
Relative Risk Males: 1.41
Relative Risk Females: 1.41
Partnered Status:
Relative Risk Males (married is reference group) Widowed: 2.18
Relative Risk Males Divorced: 1.65
Relative Risk Males Separated: 1.63
Relative Risk Males Never Married: 1.72
Relative Risk Females Widowed: 1.32
Relative Risk Females Divorced: 1.00
Relative Risk Females Separated: 1.02
Relative Risk Females Never Married: 1.26

Social Support:
Relative Risk Males: 1.08
Relative Risk Females: 1.59

Employment:
Relative Risk Males: 1.60
Relative Risk Females: 1.25

Usual Source of Care:
Hazard Ratio Males: 1.10
Hazard Ratio Females: 1.28

Health Insurance:
Relative Risk Males (private insurance reference group) Public Health Insurance: 2.4
Relative Risk Males No Health Insurance: 1.5
Relative Risk Females Public Health Insurance: 1.6
Relative Risk Females No Health Insurance: 0.8