OPTIMAL INDICATORS OF SOCIOECONOMIC STATUS FOR HEALTH RESEARCH

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ABSTRACT

Objectives: This paper examines the relationship between various measures of SES and mortality for a representative sample of individuals.

Methods: Data are from the Panel Study of Income Dynamics. Sample includes 3,734 individuals aged 45 and above who participated in the 1984 interview. Mortality was tracked between 1984 and 1994 and is related to SES indicators using Cox event-history regression models.

Results: Wealth has the strongest associations with subsequent mortality, and these associations differ little by age and sex. Other economic measures, especially family-size-adjusted household income, have significant associations with mortality, particularly for nonelderly women.

Conclusions: By and large, the economic components of SES have associations with mortality that are at least as strong as, and often stronger than, more conventional components (e.g., completed schooling, occupation).

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INTRODUCTION

Although numerous studies have documented the importance of socioeconomic status (SES) to a variety of health outcomes,[1-6] comprehensive measures of SES are not routinely collected in the United States. In addition, most SES data that are obtained are not reported.[7-9] This data deficiency was highlighted at a recent federally-sponsored health conference on SES and has been noted by the National Committee on Vital and Health Statistics (NCVHS). In both cases, the recommendation was for regular collection of SES data and for the use of SES variables in studies of differential health outcomes.[10]

Despite growing awareness of the need for regular collection of SES measures, there remains little agreement on which SES measures should be gathered.[11] One problem is that numerous measures of SES status have been shown to affect health outcomes, e.g., occupation,[16] education,[17,18] and household income.[19-22] Moreover, researchers have shown that these measures are not interchangeable,[23-26] and that the impact of any particular SES measure on health varies across social groups, gender, and age.[27-30] The fact that various measures of SES may summarize different components of overall health risk suggests that a systematic evaluation of the explanatory power of various SES measures is required before an effective set of optimal indicators can be created.

This paper contributes to this examination by evaluating the relationship between a set of SES measures, available from both administrative and survey data sources, and mortality for a

nationally-representative sample of individuals. The analysis takes advantage of a unique data set, the Panel Study of Income Dynamics, to examine the predictive power of a variety of SES measures. Specifically the analysis focuses on the economic components of SES, differentiating between household and individual measures, stocks versus flows, and short versus long-run circumstances. In addition, the paper distinguishes among measures of SES that can be gathered in administrative data sources such as birth and death records, as well as in cross-sectional and longitudinal surveys. The results confirm previous research on the link between administrative SES measures and mortality, and suggest that economic components of SES should be a standard feature of our measurement system for monitoring links between SES and health.

MEASURES OF SES

In general, measures of socioeconomic status are meant to provide information about an individual's access to social and economic resources. In practice, numerous indicators fit this description. Among the most commonly used are education and occupation. Less commonly used, but potentially as important, are economic measures such as income, the wage rate, and wealth. The following section describes the benefits and drawbacks of each of these measures.

Years of completed schooling are reported with reasonable ease and reliability and are a meaningful indicator of SES for virtually all adults. These factors led to the selection of education for the death certificate in 1989,[31] and the preliminary assessment of the National Committee of Vital and Health Statistics that education may be the most feasible SES indicator for administrative databases.[32] However, because education is typically completed early in adulthood, it captures neither differential on-the-job training and other career investments made

by individuals with similar levels of formal schooling, nor the volatility in economic status during adulthood that has recently been shown to have adverse implications for health.[33]

Usual or most recent occupation also has been long employed as an indicator of SES and is useful for persons who have had labor force experience. Measures of occupational class are widely used in other industrialized countries and have been found robust in predicting variations in health status.[34] The NIH conference called for occupation to be included as a core SES variable in the U.S.[35] Still, occupation is problematic for subgroups of the population, such as teen mothers and others with little labor market experience. Moreover, later-career occupations, unlike education, are more subject to reverse causation problems in which poor health leads to declines in occupational status.

Income has been used more widely as a measure of SES in studies based in the United States than elsewhere. The most typical income-based measure is a household's total cash income, measured over the month, calendar year, or 12-month period prior to the point of measurement.[36-38] Measures of disposable household income, obtained by subtracting from total cash income the taxes paid by households, better approximate a household's flow of resources, although they obviously require difficult-to-obtain tax data. Occasionally, studies are able to use an income measure that has been averaged over a number of years.[39,40]

As with occupation, it is difficult to disentangle health selection and social causation mechanisms using proximal measurements of income and health. Because of the high volatility in income from one month or year to the next,[41] questions about "usual income" are ill-advised.[42] Moreover, an annual (or multi-year) income measure often has greater explanatory power than a

monthly (or single-year) measure.[43] Longitudinal surveys are especially valuable for assessing income-based SES, since they can facilitate the monitoring of changes in SES over time. Contrary to popular belief, it is possible to ask about income in surveys and encounter few problems of nonresponse.[44]

Individual labor-market earnings measured on an annual or per-hour basis is another indicator of economic circumstances, but appropriate only for persons with labor force experience. Although many economists would consider the hourly wage rate to be a conceptually superior measure of income-based SES, it is rarely used by health researchers. The hourly wage rate is typically measured by dividing labor market earnings over some time period by the total number of hours worked during that time. The wage rate is conceived by economists as a measure of the stock of economically valuable skills acquired before (i.e. through formal schooling) and during (i.e. through on-the-job training) adulthood. As such, it reflects the value of "human wealth" (human capital) and complements the concept of financial wealth. Although individuals not currently working have zero labor market earnings, they may still have a positive wage rate, that is, the amount per hour they could earn if they did work. Observed or imputed wage rates are often conceived as general measures of the productivity of an individual's time both in and out of the labor market.

In contrast to income, which consists of a flow of resources over some time period, wealth captures the stock of assets or economic reserves at a given point in time. Income and wealth are positively correlated, but distinct, as can be seen most readily in the case of an elderly individual with little cash income but substantial wealth. For most of the United States

population, wealth is tied up in cars and homes—items for which survey nonresponse bias can be minimized. Several studies in both the United States and the United Kingdom find that indicators of wealth are related to health, independent of the more traditional indicators of SES.[45-48]

DATA

Data used to assess linkages between SES indicators and mortality come from the Panel Study of Income Dynamics (PSID), an ongoing longitudinal study of a representative sample of individuals living in the U.S. and of the family units in which they reside: the survey began in 1968 with mortality follow-up through 1994. The emphasis of the survey is on dynamic aspects of household economic and demographic behavior. Starting with a representative national sample of U.S. households and individuals in 1968, the PSID has collected data on individuals from those households on an annual basis. The initial-wave response rate among sampled dwellings in 1968 was 76%. Attrition was 11% between 1968 and 1969 and has remained between 2% and 3% each year since 1969. Approximately 55% of the still-living original sample of individuals continued to participate in the study in the interviewing year 1995.

Probability-of-selection weights are available to adjust for differential nonresponse not related to mortality, as well as the design-driven unequal selection probabilities of the original sample. These make it possible to generate estimates that are representative of the U.S. population, with the exception of some immigrants to the U.S. since 1968. Studies evaluating the national representativeness of the surviving PSID sample at various points (including the 1984 point used to define our sample) have found no significant problems.[49]

Death is recorded in the PSID as a reason for attrition from the sample. In the majority of instances, deaths are reported in the next annual interview by a surviving household member. For persons who were living alone when last interviewed, information about death comes from a variety of sources, including a surviving contact person, the administrator of the deceased person's estate, or the post office via returned mail. Comparisons of the PSID and vital statistics mortality data from the National Center for Health Statistics generally show close agreement.

Sample. Our analysis of PSID data is based on 3,734 individuals age 45 and above who were present at the time of the 1984 interview. Some 2,526 were age 45-64 in 1984 and 1,208 were age 65 or older at that time. The possible mortality of these individuals is tracked between 1984 and 1994 and is related to SES indicators using Cox event-history regression models that include additive controls for age in 1984, race (black or all other), and sex. There were 298 deaths recorded for the nonelderly sample and 535 deaths recorded for the elderly sample.

Although our relatively small sample size precluded estimation of separate models for most demographic subgroups, we did estimate a complete set of models separately for nonelderly males and females (under age 65 in 1984; n=1,091 and 1,435, respectively) and elderly (age 65 or older in 1984; n=488 and 720, respectively). In all cases, we calculate robust standard errors using STATA that account for the geographically-clustered nature of the sample.[50]

We distinguish three kinds of SES indicators: i) "administrative data" indicators that can be collected in most health data, including death and birth certificates; ii) "survey" indicators that can be collected in a household survey; and iii) "exogenous" indicators measured a decade or

more prior to the measurement of the health outcome and likely free from the serious bias caused by health status affecting SES.

"Administrative data" indicators. Included in our set of readily-collected SES measures are years of completed schooling, most recent occupation and total family income.[1] A direct question about completed schooling was asked in several of the PSID's interviewing waves; we took the most recent report prior to the 1984 interview. Information about occupation was asked in the PSID whenever a respondent reported working at the time of the interview or in the calendar year preceding the interview; again, we took the most recent report prior to the 1984 interview. Questions used to determine occupation are identical to those asked in Census Bureau surveys.

Total household income comes from a series of questions asked in the 1984 interview about components of income received by all family members during calendar year 1983. The detailed nature of the questions is likely to lead to more reliable measurement of income than would be obtained from a single question. In contrast to other income-based indicators described below, we do not subtract taxes from household income since the data required for this adjustment are not likely to be available in administrative data sources.

"Survey-based" indicators. Our list of "survey-based" indicators consists of measures of SES that can be collected in a cross-sectional or short-run longitudinal household survey. Our household-income measure averages reports of household income over the five calendar years

[1] To the extent that morticians report information on death certificates, it may not be feasible to collect sufficiently high-quality income information on death certificates.

between 1979 and 1983, after each of the reports was inflated to 1984 price levels using the CPI-UX1 component of the Consumer Price Index. To approximate disposable household income, we subtracted Federal and Social Security taxes from the household's total cash income.

We obtained a household-size-adjusted measure of household income by dividing an individual's household income by a Census-Bureau-based poverty threshold that accounts for family size. For example, in 1997, the poverty threshold for a family of four was $16,404; an individual with that level of household income would have an "income/needs" ratio of 1.0; an income of $32,808 would produce a ratio of 2.0.

Our measure of the individual's wage rate (i.e., hourly earnings) is obtained by dividing annual labor income by the total number of hours worked during the year. We inflate and average hourly earnings over the years between 1979 and 1983 for years in which the individual reported working 250 hours or more.

A measure of household wealth at the time of the 1984 interview was constructed from a sequence of questions designed to gather comprehensive information about the assets and liabilities of the household.

Indicators for long-term prospective studies. That SES measures may reflect rather than cause health status is a bedeviling problem for studies of SES-health linkages. Reverse causation is presumably least problematic in the case of completed schooling, which is typically completed prior to the point when the ability to complete schooling is affected by decrements to health that accompany aging. However, the same cannot be said for measures of household income and wealth, individual earnings, and occupational attainment.

The PSID data span a long period, dating back to 1968, and thus provide the opportunity for SES measurement a decade or more prior to the period over which mortality is measured. Our strategy for compiling a set of "exogenous" indicators of SES is to measure everything prior to the 1976 interview and to adjust our regression estimates to reflect whether individuals reported health limitations in the 1976 interview. Our three "exogenous" indicators include household income, family-size-adjusted household income and hourly earnings, all inflated to 1984 price levels using the CPI-UX1 component of the Consumer Price Index and averaged over the years between 1967 and 1975. In the case of hourly earnings, we averaged over the years in which reported work hours exceeded 250. To minimize possible effects of health selection, we also control in this analysis for disability as defined by a 1976 self-reported response to the question: "Do you have any physical or nervous condition that limits the type of work or the amount of work that you can do?" Descriptive statistics for all variables are provided in Table 1.

RESULTS

Table 2 presents Cox-regression-based odds ratio estimates and 95% confidence intervals for our various "administrative data" indicators of SES. In every case, the Cox regression includes controls for age, race and the given (but no other) SES measure. In cases where the male and female samples are combined, the Cox regression also controls additively for sex. Continuous SES measures are divided into quintiles based on the entire sample of individuals.

The first three rows of Table 2 indicate that completed schooling is a significant predictor of mortality for some but not all of the samples. Women in the pre-retirement sample who did not attend college had mortality risks more than twice those of women who had taken at least

some college work, but the differences were not significant at conventional levels. All other school-based risk ratios were less than 2.0 and only sporadically attained statistical significance at conventional levels. Occupation was mildly predictive of mortality. Relative to the omitted group of individuals who had worked in professional occupations, individuals who had worked in low-skill blue-collar occupations generally had higher mortality risks, but the differences rarely proved statistically significant. Risk ratios exceeded 2.0 only in the case of the female laborers, operatives and craft workers who began the mortality risk period under the age of 65.[2]

One-year (1983 in this case) family income emerged as a more powerful correlate of 1984-1994 mortality than either completed schooling or occupation. Income had a particularly high association with mortality for pre-retirement women (RR=3.89, CI=1.62,9.38 for women in bottom versus top income quintile), but was significant as well for pre-retirement men (RR=2.97, CI=1.02,8.68). For both preretirement men and women, the mortality gradient with respect to income was significant through the middle quintile. In the post-retirement sample, income was a uniformly insignificant predictor of mortality, with comparative risk ratios never exceeding 1.6.

Results for the "survey-based" indicators of SES are presented in Table 3 and show that household wealth has the strongest associations with subsequent mortality. Both men and women under age 65 in 1984 and in the bottom wealth quintile had mortality risks roughly three times as high (RR=2.81,CI=1.19, 6.65 for men; RR=3.01, CI=1.33, 6.84 for women) as those of similarly-aged men and women whose household wealth placed them in the top quintile. In

[2]Small sample sizes precluded separate risk estimates within these three occupational categories for women.

contrast to single-year income, the wealth-mortality association was also significant for the age 65+ cohorts, although the risk ratios were one third lower (RR=2.11,CI=1.19,3.75 for men; RR=2.00,CI=1.26,3.15 for women) relative to the under age 65 cohorts.

We assume that the interview in which the SES information is gathered provides five annual observations on family income as well as the information needed to adjust income for family size using U.S. poverty thresholds (thus producing the measure labeled "Income to Needs"). With one exception, averaging income over the five-year interval between 1979 and 1983 changed relative mortality risk estimates very little from those based on single-year (1983) income alone. Bottom-to-top decile comparisons of longer-run household income produce a higher risk ratio for pre-retirement women (RR=4.88, CI=1.94,12.3) relative to single-year income. Surprisingly, the corresponding risk ratio for men is 1.0, although it jumps up to 3.05 for the second-decile income group.

Dividing income by family size produced the largest risk ratio found in our entire analysis – pre-retirement females in the bottom decile of the five-year income-to-needs distribution had nearly seven times the morality risk (RR= 6.95; CI=2.81, 17.2) of similarly-aged women in the top decile. This suggests that it is the combination of low incomes and larger family sizes during the pre-retirement years that elevate women's risks the most.

Hourly earnings had at best a modest association with subsequent mortality. The contrast between hourly earnings and other measures of economic status are most striking for pre-retirement women, suggesting that family resources matter much more for health than the woman's own productivity of time.

Results for the final set of indicators are drawn a decade or more prior to the beginning of the interval over which mortality is assessed (Table 4). To enhance our efforts to assess the exogenous effects of these SES components, we include an additive control for self-reported work limitations into all of the Cox regressions.

By and large, measuring the economic component of SES in the late 1960s and early 1970s weakens but does not eliminate patterns found with the economic components measured in the late 1970s and early 1980s. Household income, in this case averaged over the 1967-1975 interval, continues to have stronger associations with subsequent mortality for women than men and for younger than older cohorts, and adjusting income for family size produces the strongest associations of all for women. Lowest-to-highest quintile risk ratios for these women are 3.26 (CI=1.19, 8.88) for family income and 5.15 (1.72, 15.4) for size-adjusted family income. Wage rate continues to have only modest associations with morality.

Risk ratios for the older cohorts are generally higher with the more distant than more recent SES measures, suggesting that economic status during the pre-retirement years is more important for health than economic status during retirement. The fact that the risk ratios are never as strong for the older as for the younger cohorts suggests that some of the health effects of SES may take the form of survival until age 65.

DISCUSSION

We have sought to enumerate alternative measures of SES and to assess their associations to mortality using prospective data from a nationally representative survey. Our particular focus has been on the economic components of SES, and we have sought to differentiate household

versus individual, stock versus flow and short versus long-run dimensions. In our empirical work we distinguish among measures that can be gathered in administrative data sources such as birth and death certificates, as well as in cross-sectional and longitudinal surveys. We use the long-run nature of our prospective data to measure some SES components well before they might be affected by health conditions themselves.

Although we find some SES-mortality gradients for conventional SES measures of education and occupation, the most powerful associations are found for the economic components, especially wealth and, for women, family-size-adjusted family income. We find robust associations between income and mortality that often weaken but are far from eliminated when income is measured a decade or more before the beginning of our mortality window. We are unable to ascertain with our data whether wealth-mortality associations are robust with respect to the timing of measurement.

One of the most striking results is the high mortality risk for women with a combination of low incomes and large family sizes during their pre-retirement years. Even when income is measured more than a decade before the beginning of the mortality-risk window, the odds ratios of women in the bottom one-fifth of the income distribution are still more than five times as high as those of women in the top fifth. The strength of these associations, and the contrast with those of men, suggests the importance of efforts[51] to understand the very different ways in which SES affects the health of men and women.

Our results suggest that economic components of SES should be a standard feature of our measurement system for monitoring links between SES and health. It is feasible to gather

reasonably valid information about income and wealth in surveys without compromising response rates.[52] Efforts to do so as part of collecting administrative data may be more difficult. However, the much greater explanatory power of income and wealth-based measures of SES as compared with the more conventional measures of education and occupation suggests the value of methodological efforts supporting the collection of economic measures as part of administrative data systems.

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Table 1
Descriptive Statistics for Variables Used in Cox Regressions

	Age 45-64			Age 65+		
	Total	**Men**	**Women**	**Total**	**Men**	**Women**
Sample Size	2526	1091	1435	1208	488	720
Administrative Data Indicators						
Education						
Education <= 8	0.21 (0.41)	0.24 (0.42)	0.20 (0.40)	0.41 (0.49)	0.45 (0.50)	0.39 (0.49)
Education = 9-11	0.21 (0.41)	0.19 (0.39)	0.22 (0.42)	0.16 (0.37)	0.13 (0.33)	0.19 (0.39)
Education = 12	0.35 (0.48)	0.28 (0.45)	0.41 (0.49)	0.26 (0.44)	0.24 (0.43)	0.27 (0.44)
Education = College	0.21 (0.41)	0.28 (0.45)	0.16 (0.37)	0.15 (0.36)	0.14 (0.35)	0.17 (0.37)
Last Occupation						
Laborer	0.05 (0.22)	0.10 (0.29)	0.01 (0.11)	0.04 (0.21)	0.09 (0.29)	0.01 (0.12)
Operative	0.17 (0.38)	0.16 (0.37)	0.18 (0.38)	0.23 (0.42)	0.22 (0.41)	0.24 (0.43)
Crafts	0.09 (0.29)	0.21 (0.40)	0.01 (0.09)	0.05 (0.23)	0.12 (0.33)	0.01 (0.08)
Clerical	0.13 (0.34)	0.05 (0.22)	0.19 (0.39)	0.09 (0.29)	0.04 (0.20)	0.13 (0.33)
Service	0.19 (0.39)	0.11 (0.31)	0.25 (0.43)	0.06 (0.25)	0.06 (0.24)	0.07 (0.25)
Manager	0.10 (0.30)	0.16 (0.37)	0.06 (0.23)	0.03 (0.18)	0.06 (0.24)	0.02 (0.13)
Professional	0.09 (0.29)	0.12 (0.33)	0.07 (0.26)	0.06 (0.24)	0.08 (0.27)	0.05 (0.22)
1983 Pre-Tax Family Income						
Bottom Decile	0.10 (0.30)	0.05 (0.21)	0.14 (0.34)	0.25 (0.43)	0.16 (0.37)	0.31 (0.46)
Second Decile	0.09 (0.29)	0.07 (0.26)	0.11 (0.31)	0.18 (0.38)	0.15 (0.36)	0.20 (0.40)
Next to Bottom Quintile	0.19 (0.39)	0.16 (0.36)	0.21 (0.41)	0.25 (0.43)	0.29 (0.45)	0.23 (0.42)
Middle Quintile	0.20 (0.40)	0.21 (0.41)	0.19 (0.39)	0.16 (0.37)	0.18 (0.38)	0.15 (0.35)
Next to Highest Quintile	0.21 (0.40)	0.25 (0.43)	0.18 (0.38)	0.10 (0.30)	0.13 (0.34)	0.08 (0.27)
Highest Quintile	0.21 (0.41)	0.26 (0.44)	0.17 (0.37)	0.05 (0.23)	0.08 (0.27)	0.04 (0.19)
Survey-Based Indicators						
Total Wealth						
Bottom Decile	0.18 (0.38)	0.12 (0.33)	0.22 (0.41)	0.21 (0.41)	0.17 (0.37)	0.24 (0.43)
Second Decile	0.12 (0.32)	0.10 (0.30)	0.13 (0.33)	0.13 (0.33)	0.11 (0.32)	0.14 (0.34)
Next to Bottom Quintile	0.21 (0.41)	0.22 (0.42)	0.21 (0.41)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)
Middle Quintile	0.17 (0.38)	0.18 (0.39)	0.16 (0.37)	0.15 (0.36)	0.16 (0.37)	0.14 (0.35)
Next to Highest Quintile	0.16 (0.37)	0.19 (0.39)	0.14 (0.35)	0.15 (0.36)	0.15 (0.36)	0.15 (0.35)
Highest Quintile	0.15 (0.36)	0.18 (0.38)	0.14 (0.34)	0.15 (0.36)	0.20 (0.40)	0.12 (0.33)
1979-83 Post-Tax Family Income						
Bottom Decile	0.08 (0.27)	0.03 (0.18)	0.11 (0.32)	0.25 (0.44)	0.16 (0.37)	0.32 (0.47)
Second Decile	0.10 (0.30)	0.07 (0.25)	0.12 (0.33)	0.19 (0.39)	0.18 (0.38)	0.20 (0.40)
Next to Bottom Quintile	0.20 (0.40)	0.17 (0.38)	0.23 (0.42)	0.23 (0.42)	0.26 (0.44)	0.22 (0.41)
Middle Quintile	0.21 (0.41)	0.24 (0.42)	0.19 (0.39)	0.15 (0.35)	0.17 (0.38)	0.13 (0.33)
Next to Highest Quintile	0.20 (0.40)	0.24 (0.42)	0.17 (0.38)	0.11 (0.31)	0.14 (0.34)	0.09 (0.28)
Highest Quintile	0.20 (0.40)	0.25 (0.43)	0.17 (0.37)	0.06 (0.24)	0.10 (0.30)	0.04 (0.20)
1979-1983 Income to Needs						
Bottom Decile	0.15 (0.36)	0.10 (0.30)	0.19 (0.39)	0.23 (0.42)	0.20 (0.40)	0.26 (0.44)
Second Decile	0.11 (0.32)	0.10 (0.30)	0.13 (0.33)	0.17 (0.38)	0.15 (0.36)	0.18 (0.39)
Next to Bottom Quintile	0.19 (0.39)	0.18 (0.38)	0.20 (0.40)	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)
Middle Quintile	0.19 (0.39)	0.20 (0.40)	0.17 (0.38)	0.15 (0.36)	0.15 (0.36)	0.14 (0.35)
Next to Highest Quintile	0.18 (0.38)	0.21 (0.40)	0.16 (0.36)	0.12 (0.32)	0.14 (0.35)	0.10 (0.30)
Highest Quintile	0.18 (0.38)	0.21 (0.41)	0.15 (0.36)	0.10 (0.30)	0.13 (0.33)	0.08 (0.28)

Table 2
Mortality Risk and SES
Relative Risk Calculations from Cox Regressions Using PSID Data
Adjusted for Age, Race, and Gender

Administrative Data Indicators	**Age 45-64**			**Age 65+**		
	Total	**Men**	**Women**	**Total**	**Men**	**Women**
Sample Size	2526	1091	1435	1208	488	720
Education (RC= College)						
Education <= 8	1.43 (0.89, 2.30)	1.04 (0.61, 1.77)	2.67 (0.95, 7.51)	1.33 (1.01, 1.75)*	1.38 (0.96, 1.99)	1.27 (0.90, 1.80)
Education = 9-11	1.61 (0.97, 2.68)	1.46 (0.77, 2.77)	2.18 (0.77, 6.11)	1.57 (1.09, 2.27)*	1.58 (0.98, 2.55)*	1.60 (1.00, 2.57)*
Education = 12	1.46 (0.95, 2.26)	1.17 (0.66, 2.10)	2.24 (0.99, 5.07)	1.17 (0.83, 1.65)	0.93 (0.54, 1.63)	1.41 (0.94, 2.11)
Last Occupation (RC = Professional)						
Laborer	1.18 (0.65, 2.13)	1.19 (0.62, 2.28)	a	0.81 (0.53, 1.24)	0.96 (0.57, 1.62)	a
Operative	1.71 (1.16, 2.53)*	1.27 (0.65, 2.47)	2.45 (1.33, 4.49)*	1.34 (0.97, 1.85)	1.15 (0.75, 1.76)	1.42 (0.96, 2.10)
Crafts	0.57 (0.29, 1.12)	0.53 (0.25, 1.12)	a	0.96 (0.60, 1.54)	0.98 (0.57, 1.67)	a
Clerical	0.50 (0.25, 1.00)*	0.19 (0.06, 1.05)	0.75 (0.30, 1.88)	0.98 (0.58, 1.64)	0.93 (0.47, 1.85)	0.99 (0.54, 1.82)
Service	0.64 (0.38, 1.06)	0.53 (0.25, 1.10)	0.83 (0.39, 1.75)	1.03 (0.61, 1.74)	1.58 (0.84, 2.94)	0.67 (0.29, 1.58)
Manager	0.54 (0.28, 1.03)	0.51 (0.24, 1.07)	0.67 (0.16, 2.78)	0.91 (0.55, 1.51)	0.92 (0.50, 1.70)	b
1983 Pre-Tax Family Income (RC = Highest Quintile)						
Bottom Decile	3.11 (1.44, 6.71)*	2.97 (1.02, 8.68)*	3.89 (1.62, 9.38)*	1.53 (0.97, 2.42)*	1.56 (0.80, 3.03)	1.49 (0.75, 2.96)
Second Decile	2.90 (1.70, 4.95)*	3.09 (1.55, 6.15)*	2.97 (1.23, 7.18)*	1.52 (0.91, 2.54)	1.33 (0.68, 2.60)	1.54 (0.71, 3.35)
Next to Bottom Quintile	2.35 (1.50, 3.71)*	1.92 (1.08, 3.40)*	3.30 (1.42, 7.66)*	1.10 (0.71, 1.70)	1.26 (0.71, 2.23)	0.94 (0.44, 1.99)
Middle Quintile	1.32 (0.71, 2.47)	1.00 (0.46, 2.16)	2.21 (0.83, 5.85)	1.03 (0.64, 1.65)	0.83 (0.44, 1.55)	1.24 (0.61, 2.53)
Next to Highest Quintile	1.35 (0.84, 2.17)	1.06 (0.56, 2.02)	2.08 (0.97, 4.47)	1.09 (0.68, 1.72)	1.16 (0.64, 2.12)	0.90 (0.39, 2.06)

a : Laborer and crafts categories combined with operative due to n < 25.
b : Manager combined with professional category due to n < 25.
* : Significant at the 5% level.

Table 3
Mortality Risk and SES
Relative Risk Calculations from Cox Regressions Using PSID Data
Adjusted for Age, Race, and Gender

Survey-Based Indicators	**Age 45-64**			**Age 65+**		
Total Wealth	**Total**	**Men**	**Women**	**Total**	**Men**	**Women**
Bottom Decile	2.89 (1.53, 5.44)*	2.81 (1.19, 6.65)*	3.01 (1.33, 6.84)*	2.08 (1.43, 3.01)*	2.11 (1.19, 3.75)*	2.00 (1.26, 3.15)*
Second Decile	2.31 (1.37, 3.90)*	3.12 (1.46, 6.73)*	1.89 (0.73, 4.87)	1.63 (1.14, 2.33)*	1.49 (0.84, 2.64)	1.68 (1.07, 2.64)*
Next to Bottom Quintile	1.76 (1.13, 2.75)*	1.24 (0.64, 2.41)	2.58 (1.22, 5.45)*	1.73 (1.29, 2.31)*	1.93 (1.25, 2.99)*	1.53 (1.02, 2.30)*
Middle Quintile	1.46 (0.94, 2.26)	1.48 (0.77, 2.84)	1.45 (0.73, 2.91)	1.16 (0.92, 1.47)	1.28 (0.86, 1.91)	1.07 (0.68, 1.68)
Next to Highest Quintile	1.01 (0.61, 1.69)	1.03 (0.49, 2.13)	0.96 (0.36, 2.57)	0.90 (0.65 1.23)	1.07 (0.67, 1.71)	0.76 (0.47, 1.21)
1979-1983 Post-Tax Family Income						
Bottom Decile	2.69 (1.19, 6.09)*	1.00 (0.18, 5.73)	4.88 (1.94, 12.3)*	1.26 (0.78, 2.04)	1.16 (0.61, 2.21)	1.48 (0.73, 3.02)
Second Decile	2.83 (1.58, 5.06)*	3.05 (1.50, 6.23)*	3.28 (1.28, 8.39)*	1.46 (0.90, 2.36)	1.14 (0.64, 2.06)	1.96 (0.90, 4.25)
Next to Bottom Quintile	1.92 (1.17, 3.14)*	1.55 (0.86, 2.79)	2.79 (1.18, 6.61)*	1.06 (0.68, 1.65)	1.04 (0.61, 1.77)	1.21 (0.54, 2.70)
Middle Quintile	1.52 (0.85, 2.73)	1.24 (0.57, 2.68)	2.34 (0.95, 5.76)	0.97 (0.61, 1.56)	0.84 (0.46, 1.54)	1.22 (0.59, 2.53)
Next to Highest Quintile	1.40 (0.85, 2.31)	1.06 (0.54, 2.06)	2.38 (1.05, 5.38)*	0.94 (0.57, 1.55)	0.78 (0.41, 1.48)	1.30 (0.58, 2.91)
1979-1983 Income to Needs						
Bottom Decile	2.77 (1.50, 5.11)*	1.25 (0.46, 3.39)	6.95 (2.81, 17.2)*	1.48 (1.04, 2.11)*	1.64 (0.89, 3.02)	1.28 (0.81, 2.02)
Second Decile	1.99 (1.06, 3.73)*	2.14 (1.06, 4.34)*	2.49 (0.86, 7.22)	1.26 (0.86, 1.84)	1.33 (0.77, 2.28)	1.08 (0.65, 1.79)
Next to Bottom Quintile	1.84 (1.07, 3.17)*	1.44 (0.71, 2.91)	3.75 (1.45, 9.70)*	1.34 (0.96, 1.88)	1.54 (0.94, 2.52)	1.16 (0.71, 1.90)
Middle Quintile	1.07 (0.57, 2.00)	0.87 (0.39, 1.91)	2.00 (0.73, 5.49)	0.94 (0.64, 1.37)	0.97 (0.56, 1.69)	0.86 (0.51, 1.44)
Next to Highest Quintile	1.29 (0.74, 2.23)	0.83 (0.40, 1.70)	3.25 (1.46, 7.27)*	0.82 (0.57, 1.18)	1.15 (0.67, 1.99)	0.48 (0.24, 0.95)*
1979-1983 Wages						
Bottom Decile	1.71 (0.84, 3.49)	1.57 (0.91, 2.72)	1.30 (0.48, 3.56)	1.55 (1.08, 2.23)*	0.90 (0.48, 1.70)	2.67 (1.26, 5.66)*
Second Decile	1.48 (0.68, 3.24)	1.00 (0.23, 4.34)	1.27 (0.56, 2.90)	1.84 (1.23, 2.74)*	2.02 (1.28, 3.19)*	1.95 (0.87, 4.41)
Next to Bottom Quintile	1.51 (0.82, 2.79)	1.31 (0.62, 2.76)	1.25 (0.50, 3.14)	1.64 (1.10, 2.43)*	1.54 (0.95, 2.47)	2.24 (1.02, 4.91)*
Middle Quintile	1.21 (0.64, 2.29)	0.99 (0.48, 2.06)	1.04 (0.42, 2.59)	1.87 (1.19, 2.92)*	1.80 (1.11, 2.93)*	2.56 (1.05, 6.26)*
Next to Highest Quintile	1.48 (0.86, 2.54)	1.24 (0.71, 2.19)	b	1.13 (0.67, 1.90)	1.38 (0.80, 2.38)	b
No Wages Earned	1.38 (0.77, 2.48)	a	1.54 (0.75, 3.17)	1.35 (0.97, 1.87)*	2.71 (1.51, 5.10)*	1.00 (0.68, 1.46)

a : No wages combined with bottom decile due to n < 25.
b : Next to highest quintile combined with highest quintile due to n < 25.
* : Significant at the 5% level. Reference Category: Highest Quintile.

Table 4
Mortality Risk and SES
Relative Risk Calculations from Cox Regressions Using PSID Data
Adjusted for Age, Race, Gender, and Disability

"Exogenous" Indicators	Age 45-64			Age 65+		
	Total	**Men**	**Women**	**Total**	**Men**	**Women**
1969-1975 Post-Tax Family Income						
Bottom Decile	2.19 (1.13, 4.30)*	2.19 (0.78, 6.14)	3.26 (1.19, 8.88)*	1.59 (1.05, 2.43)*	1.67 (0.98, 2.84)	1.07 (0.58, 1.98)
Second Decile	1.74 (0.96, 3.15)	0.93 (0.47, 1.84)	3.35 (1.35, 8.29)*	1.18 (0.81, 1.72)	1.51 (0.99, 2.30)	0.72 (0.39, 1.35)
Next to Bottom Quintile	1.49 (0.90, 2.46)	1.22 (0.63, 2.37)	2.17 (1.06, 4.76)*	1.25 (0.84, 1.87)	1.67 (1.04, 2.66)*	0.73 (0.39, 1.36)
Middle Quintile	1.52 (0.96, 2.40)	1.11 (0.60, 2.07)	2.59 (1.09, 6.11)*	0.95 (0.61, 1.47)	1.12 (0.64, 1.99)	0.64 (0.34, 1.21)
Next to Highest Quintile	1.08 (0.63, 1.84)	0.82 (0.43, 1.56)	1.74 (0.73, 4.19)	1.05 (0.69, 1.59)	1.47 (0.90, 2.40)	0.57 (0.28, 1.17)
1969-1975 Income to Needs						
Bottom Decile	2.02 (1.17, 3.47)*	1.11 (0.49, 2.50)	5.15 (1.72, 15.4)*	1.72 (1.25, 2.36)*	1.66 (0.96, 2.87)	1.57 (0.98, 2.50)
Second Decile	1.60 (0.91, 2.80)	1.27 (0.64, 2.53)	2.75 (0.73, 10.3)	1.66 (1.18, 2.34)*	1.91 (1.25, 2.93)*	1.34 (0.76, 2.37)
Next to Bottom Quintile	1.20 (0.69, 2.11)	0.76 (0.38, 1.52)	2.94 (0.95, 9.11)	1.55 (1.14, 2.10)*	1.67 (1.09, 2.56)*	1.33 (0.83, 2.12)
Middle Quintile	1.44 (0.93, 2.22)	1.28 (0.77, 2.12)	2.12 (0.68, 6.61)	1.45 (1.04, 2.03)*	1.60 (1.06, 2.40)	1.24 (0.70, 2.21)
Next to Highest Quintile	1.28 (0.80, 2.06)	0.64 (0.35, 1.19)	4.18 (1.43, 12.2)	1.02 (0.73, 1.42)	1.26 (0.76, 2.09)	0.75 (0.44, 1.29)
1969-1975 Wages						
Bottom Decile	1.96 (0.87, 4.38)	1.77 (0.46, 6.81)	2.84 (0.44, 18.4)	1.52 (1.00, 2.31)*	0.95 (0.53, 1.73)	1.57 (0.78, 3.15)
Second Decile	2.09 (1.15, 3.76)*	2.83 (1.53, 5.26)*	2.62 (0.48, 14.4)	1.51 (1.04, 2.19)*	1.10 (0.59, 2.03)	1.49 (0.70, 3.19)
Next to Bottom Quintile	1.50 (0.80, 2.80)	1.90 (0.92, 3.92)	1.87 (0.33, 10.5)	1.51 (1.04, 2.17)*	1.33 (0.83, 2.13)	1.16 (0.51, 2.67)
Middle Quintile	1.13 (0.66, 2.13)	0.62 (0.28, 1.38)	3.28 (0.45, 23.7)	1.31 (0.81, 2.13)	1.15 (0.67, 1.97)	1.10 (0.47, 2.58)
Next to Highest Quintile	1.96 (1.16, 3.30)	1.95 (1.17, 3.25)*	2.23 (0.29, 17.3)	1.26 (0.78, 2.05)	1.15 (0.71, 1.86)	a
No Wages Earned	1.05 (0.58, 1.90)	1.30 (0.33, 5.19)	1.05 (0.50, 2.20)	1.20 (0.87, 1.67)	1.81 (1.09, 3.00)*	1.02 (0.67, 1.55)

a : Next to highest quintile combined with highest quintile due to small sample sizes for these cells.
* : Significant at the 5% level. Reference category: Highest Quintile.

1979-1983 Wages						
Bottom Decile	0.17 (0.38)	0.04 (0.21)	0.27 (0.44)	0.43 (0.49)	0.21 (0.41)	0.58 (0.49)
Second Decile	0.11 (0.32)	0.03 (0.18)	0.18 (0.38)	0.12 (0.32)	0.12 (0.33)	0.11 (0.32)
Next to Bottom Quintile	0.19 (0.39)	0.12 (0.33)	0.24 (0.43)	0.16 (0.36)	0.20 (0.40)	0.13 (0.34)
Middle Quintile	0.19 (0.39)	0.20 (0.40)	0.18 (0.39)	0.12 (0.33)	0.15 (0.36)	0.10 (0.30)
Next to Highest Quintile	0.17 (0.38)	0.28 (0.45)	0.09 (0.29)	0.09 (0.29)	0.16 (0.37)	0.05 (0.21)
Highest Quintile	0.16 (0.36)	0.32 (0.46)	0.04 (0.19)	0.08 (0.27)	0.15 (0.36)	0.03 (0.16)
No Wages Earned	0.10 (0.29)	0.02 (0.15)	0.15 (0.36)	0.29 (0.45)	0.12 (0.32)	0.41 (0.49)
Exogenous Indicators						
1969-1975 Post-Tax Family Income (RC= Highest Quintile)						
Bottom Decile	0.08 (0.28)	0.05 (0.23)	0.11 (0.31)	0.27 (0.44)	0.16 (0.37)	0.34 (0.47)
Second Decile	0.12 (0.33)	0.09 (0.29)	0.15 (0.35)	0.16 (0.37)	0.16 (0.37)	0.16 (0.37)
Next to Bottom Quintile	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)
Middle Quintile	0.20 (0.40)	0.22 (0.42)	0.18 (0.39)	0.14 (0.34)	0.16 (0.37)	0.12 (0.32)
Next to Highest Quintile	0.19 (0.39)	0.21 (0.41)	0.17 (0.37)	0.10 (0.30)	0.12 (0.33)	0.08 (0.27)
Highest Quintile	0.18 (0.38)	0.19 (0.39)	0.16 (0.37)	0.10 (0.30)	0.15 (0.36)	0.07 (0.25)
1969-1975 Income to Needs (RC= Highest Quintile)						
Bottom Decile	0.20 (0.40)	0.14 (0.35)	0.25 (0.43)	0.19 (0.39)	0.15 (0.36)	0.22 (0.41)
Second Decile	0.14 (0.34)	0.14 (0.35)	0.14 (0.34)	0.15 (0.36)	0.14 (0.34)	0.16 (0.37)
Next to Bottom Quintile	0.21 (0.41)	0.22 (0.41)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)
Middle Quintile	0.16 (0.37)	0.18 (0.38)	0.15 (0.36)	0.14 (0.35)	0.13 (0.34)	0.14 (0.35)
Next to Highest Quintile	0.15 (0.35)	0.17 (0.37)	0.13 (0.34)	0.15 (0.36)	0.17 (0.38)	0.13 (0.34)
Highest Quintile	0.14 (0.34)	0.15 (0.36)	0.12 (0.33)	0.16 (0.37)	0.20 (0.40)	0.14 (0.35)
1969-1975 Wages (RC= Highest Quintile)						
Bottom Decile	0.27 (0.45)	0.11 (0.31)	0.40 (0.49)	0.44 (0.50)	0.22 (0.41)	0.59 (0.49)
Second Decile	0.11 (0.31)	0.05 (0.23)	0.15 (0.36)	0.11 (0.31)	0.10 (0.30)	0.12 (0.33)
Next to Bottom Quintile	0.19 (0.39)	0.12 (0.33)	0.24 (0.42)	0.16 (0.36)	0.18 (0.38)	0.14 (0.35)
Middle Quintile	0.16 (0.36)	0.20 (0.40)	0.12 (0.33)	0.10 (0.31)	0.14 (0.35)	0.08 (0.27)
Next to Highest Quintile	0.14 (0.35)	0.25 (0.44)	0.06 (0.24)	0.10 (0.30)	0.16 (0.37)	0.05 (0.22)
Highest Quintile	0.13 (0.33)	0.26 (0.44)	0.02 (0.15)	0.09 (0.28)	0.20 (0.40)	0.01 (0.12)
No Wages Earned	0.19 (0.39)	0.08 (0.28)	0.27 (0.44)	0.31 (0.46)	0.13 (0.34)	0.44 (0.50)